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Bulletins Received

"Our Forest Resources: What They Are and What They Mean to Us" by Charles E. Randall is a 37-page pamphlet of the contents of which the title is descriptive. Available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., for 20 cents.

"Fish Conservation Fundamentals" by R. W. Eschmeyer, with illustrations by Otto Warbach, is a large-size, 30-page bulletin assembling material previously published in the Sport Fishing Institute Bulletin. Available from Sport Fishing Institute, Bond Building, Washington 5, D. C., for 25 cents.

"How to Have an Attractive Lawn" by H. R. Kemmerer and F. F. Weinard is a 16-page pamphlet published by the College Of Agriculture, University of Illinois, Urbana, Illinois.

"Indoor Nature Studies" by Eva L. Gordon is the 64-page Teachers' Number of the Cornell Rural School Leaflet Volume 48, Number 1, of the Department of Rural Education, Cornell University, Ithaca, New York. Twenty-five cents.

"Birds of the World on Stamps" by Sidney R. Esten is Topical Handbook No. 10 of the American Topical Association, 3306 North 50th Street, Milwaukee 16, Wisconsin. Price not stated.

"Forest Policy Statement" is an amended and approved statement of the National Lumber Manufacturers Association, 1319 18th Street, N. W., Washington 6, D. C. Free.

"Report of the Nature Conservancy" is a 56-page pamphlet reporting on the achievements of the British Nature Conservancy for the year ending September, 1954. Copies available from Her Majesty's Stationery Office, London, for three shillings.

"Consulting Foresters" is a list of consulting foresters and their addresses as of January 1, 1955, and is available from the Society of American Foresters, 17th and Pennsylvania Avenue, N. W., Washington 6, D. C.

"Greenland Fish and Wildlife Guide" is a 16-page, illustrated guide to the fish and wildlife of Greenland and is published by Caribou Press, Box 236, Bronxville, New York. Copies apparently are available from Nord Co., Forest Hills, New York.

"The Kansas School Naturalist" inaugurated its first issue with October, 1954, and is devoted to "Window Nature Study." It is edited by John Breukelman, and is sent free to any citizen of Kansas by the Kansas State Teachers College of Emporia.

"The Horse and Stamps" is a 30-page booklet published by American Topical Association, 3306 North 50th St., Milwaukee, 16, Wisconsin. The same organization publishes a magazine called *Topical Time* for philatelists specializing in topicals.

WHY THE PINE TREES WEEP

A Chippewa legend retold

By Louise J. Walker

THE Indians believed that Mongo was the first man to live on earth. He came from the land of the rising sun. He made his home along the streams of the North and the shores of the Great Lakes. Although fish and game were plentiful, Mongo was unhappy and lonesome for he had no wife to share his joys. The Great Spirit saw that Mongo was very sad. One night, Mongo sat in front of his wigwam warming himself by a big camp fire. He was suddenly startled by a bright light in the heavens. Looking up, he saw a shooting star swiftly fall to the earth. It left a train of flames in its track. The bright ball fell very near the spot where Mongo was seated. As it fell and burst into many pieces, a beautiful woman stood before him.

Mongo was frightened. He would have run away, but the beautiful woman smiled and held out her hand. She beckoned him to come to her. Her name was Wasqua, which means the new-born light. Mongo's fear suddenly left him. He felt very happy. Soon love filled his heart. Later, he led Wasqua to his wigwam where for many moons they lived happily together. They had several children. One day, Mongo became sick. Although Wasqua nursed him tenderly, he grew worse and soon died.

Mongo's death made Wasqua very unhappy. She lay upon Mongo's grave and wept. Her tears dampened the earth. She refused to eat. The birds and the animals brought her good things to eat, but she put them aside. At night, bears and wolves lay down by her side to keep her warm. Still she grieved and fasted. Morning appeared and the sun climbed high and then higher. Then he turned and slipped down his path in the sky till he came to the line called the horizon. There where earth meets the heavens, he watched while the faithful Wasqua was put in a grave by the side of her husband. The whippoorwill's voice was hushed and the howl of the wolf echoed through the forest, so great was the grief of all living creatures.

But before the sun shone upon that grave again, a great pine, like a solitary, watchful sentinel stood at the head of the grave where the first man and woman had been buried.

The pine was the first of its kind among the huge trees of the forest. Night and day it wept and sang a sweet, sad song over the lonely graves. And to this day, the pine trees weep and moan and sigh for the first born of the earth.

It is a fact that pine trees easily gather moisture which slides off the needles in the form of rain. The Indians think this moisture is Wasqua's tears, which she shed on the grave of Mongo.

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Nature in Print

By HOWARD ZAHNISER

AS one looks forward to March, if he is old enough to be looking forward at all, he is likely also to be looking backward, remembering, recalling the fresh stir of the winds, the wide sweep of sky, and probably, too, the pull of the string of a kite. For, the winds of March are as keen an anticipation of remembered pleasure as is spring itself. . . . Here are newly published books for such a mood—Guy Murchie's *Song of the Sky*, Blanche Stillson's *Wings*. The Smithsonian Institution, also recently, has inaugurated a new series of popular bulletins with a story in text, pictures, and maps of man's progress in flying, from the first glider flight in the 1890's to the superjets that now fly faster than sound, and its title is *Masters of the Air*. We are indeed creatures with wings. We can sing a song of the sky. The winds of March sweep through a world that is more nearly ours than ever before, high as well as wide.

Wings, to Blanche Stillson, are emblems—" unearthly, superhuman, spiritual, aerial"—as she thinks of them in terms of the early "visions, dreams, and tentative efforts" of earthbound man. It is no wonder, she suggests, that the organs in which the wondrous faculty of flight reside should become objects of symbolic import—emblems "of divinity, power, inspiration, mobility, speed." John Milton she quotes writing in *Comus* of "regions mild of calm and serene air,"

Above the smoke and stir of this dim spot
Which men call Earth . . .

She senses the fascination of flight for the men of the past who had never flown, and also the wonder of the air travel that our own generation has known, and she writes, with an exuberance of facts, of the mechanisms that have been wings for all that fly. Intrigued by the migrant birds, "by the fascinating spectacle of their cyclic appearance and disappearance," her interest deepened, centered "inevitably," she says, on "the wing, the organ of flight" and led her "into an expanding universe" in an "unregimented, informal, never-to-be-finished study filled with the delights of exploration through paths branching in all directions from the point of departure." So her book, too, is delightful, as well as enlightening, and perhaps all the better for combined pleasure and satisfaction in reading because it is the result of "adventure pursued," as she herself writes, "in the library, the back yard, the countryside, rather than in the classroom; through books and binoculars rather than by laboratory procedures." Into her book's well-ordered chapters she has arranged the data of her studies in a way not only to convey their information but also to share an elation of knowledge. With a sort of lyric rapture she has prefaced her chapters with quotations of poetry. For "Finis" to her last chapter she appends, with a charming bow, the verses of Liu Shih-an:

And my mind is filled and overflowing
With the things I did not say.

The things Blanche Stillson does say include accounts of insects, birds, bats, and men, beginning so far back in time that she includes in her volume a geological timetable, and concluding with the airplane flight of Wilbur and Orville Wright. Professor Blough's *Masters of the Air* brochure, "for both young and old readers," illustrates in part and overlaps Blanche Stillson's opus, but also continues on to its very publication time its account of "the sometimes-tragic, sometimes-glorious events

that were the milestones of aviation progress." Included are the stories of the Smithsonian Institution's former head, Samuel P. Langley, who was an aviation pioneer at the beginning of the twentieth century; the flying planes of World War I; the early flights across the ocean and around the world; and the achievements of the famous "firsts," such as Charles A. Lindbergh's, Wiley Post's, and Igor I. Sikorsky's. The brochure has the distinctive interest of our admiration for mechanical inventions and the "eye appeal" of a picture booklet presenting the new year's new models of a line of automobiles. But it has a deeper interest—and more nearly universal meaning—when its pages are turned with, still in mind, Blanche Stillson's admiration for insect wings, flight of bird and bat, and man's hopes that rose with his wonder at these.

The historic planes described in *Masters of the Air* are among the aeronautical collections of the Smithsonian Institution's

National Air Museum whose curator, Paul E. Garber, was technical adviser for the publication. It was through visiting these collections one bright cloudy Sunday this winter, when the winds seemed much as of March, that I came to know of this brochure, and it was with Guy Murchie's *Song of the Sky* still lyric in my mind that (with Karen) I had hastened off to the Smithsonian's collection of planes. Blanche Stillson's *Wings* I had read and, still marvelling with her and intrigued with her soaring interest, had become almost enraptured myself with Guy Murchie's moving and magnificent record of his understandings and appreciations as one of our modern voyageurs of the heavens. Seeing in the museum the aircraft in which

man had first hoped to sustain himself in air, had first flown, had first gone without stopping from New York to Paris, had exceeded in speed the speed of sound—seeing the very planes seemed to deepen the influence of Guy Murchie's expositions and exclamations. And the museum experience was later emphasized by receipt of Professor Blough's brochure. Altogether the impressions thus made of the marvels of the natural world of the sky and of man's heroism on this frontier of our own times were—and are—almost overwhelming.

Some months ago Charles A. Lindbergh's *The Spirit of St. Louis* held me fascinated and left me admiring it as an epic of literature. In his epochal flight and the reveries that punctuate his chronicle of this flight, Lindbergh, it seemed to me, had recreated enough of his world and its distinctive marvel of flight to have earned a place in the literature of epics. It was, of course, an epic that demonstrated again that much of our poetry now is at the same time prose, but I placed it with due thoughtfulness in my bookcase of poetry.

What then is to be done with Guy Murchie's *Song of the Sky*? Here is the work of a decade of one man's marshalling of knowledge, designing its best expression, distilling its inspiration into words, and writing. Here is a compendium of knowledge about winds and clouds and all the elements of weather, of the art and science of man's finding his way over land and through sky, of the history of man's mastery, so far, of flight and the exploration of its realm. Here are personal experience and informing anecdote, including the case of Dorothy Mae Stevens, frozen stiff one cold Chicago night (her first recorded temperature at the hospital the next day after some thawing 64.4°F.), who finally opened her eyes the next evening to comment: "I'm cold."

Here is a book that ponders "the little lessons:"

"If you would shield yourself with mortal armor, observe the limitations of the turtle and lobster. If you prefer a liquid body to avoid being pinched in the door or stuck with a dagger, consider the jellyfish. If you would regenerate yourself to get back

Frost

By L. MOULTON

Clouds curtain in the cold; and every leaf
And every blade of grass is edged with "frost.
Every filament and every brief
Dry stem with vibrant crystals is embossed,
As if the Maker of the Worlds would say,
'I have hung curtains up; you may not see
Valleys and hills and lofty sky to-day,
For I would have you praise leaves' filigree.'
Every lichen and every lobe of moss,
Every oak-leaf, every feathery fern
By frost is fringed, jewelled where fibres cross,
Each pattern traced meticulously to learn,
As if the Maker of the Worlds would show
The minute beauties of all things that grow.

an amputated leg or arm, consult the angle worm. If you would learn patience, control, design, study the spider."

Here is a book that thus describes the voice of the sky:

"It is the music of flight—a tone compounded of propeller grist, strut stutter, the flit of wing and tail, the aeolian humming of antenna wires, the gentle snarling of aileron and elevator and rudder... The whole slipstream is in it—that graceful, unseen flame, that flowing song that rollicks over our surfaces and out behind, curling and rolling, mewing and mumbling—mile on mile on mile.

"There are words to the song too, words to the wise who understand them—words of joy and the feel of the air, informative words about the eddies you cannot see, about airspeed and air density—stem words warning of the death that lurks below.

"The Wright brothers used to tell how fast they were flying partly by the audible swish of the air past their wings, by the gentle humming of their wires. In some small airplanes this sound may still be the only airspeed indicator and..."

One could thus quote on and on, seeking adequately to suggest what sort of book this *Song of the Sky* is. Its publishers tell on its jacket of the author's adventures in flying, of his present operation of a camp for children at East Sullivan, New Hampshire, and they conclude with the comment: "In the weather, winds, bird flights, and snowfalls of its environs he has found a wealth of familiar and original illustration which makes his book a unique combination of scientific fact and poetic figure revealing the story of man's newest element, the air." This is well said. The work is indeed one of its own kind. At first, I learn, its author considered fiction as its medium, but fact seems to have more of marvel, and, perhaps significantly of our time, the ordering of facts, their appreciation, and interpretation are creative processes. When words fail, or seem possible of graphic illumination, Mr. Murchie supplements them with drawings that are in themselves a simple delight.

All in all, one feels that here is a great book, one in which the reader follows his author through what has been a great experience in life and its frontiers of knowledge and mystery.

How better could one celebrate another returning spring, another wind-swept March, than by looking into its skies and sensing some of the immensities that man, as well as other creatures with wings, has penetrated in flight? Guy Murchie's *Song of the Sky*, Blanche Stillson's *Wings*—these are books for such a March.

Masters of the Air. By Glenn O. Blough with the technical assistance of Paul E. Garber. Washington, D. C.: The Smithsonian Institution, 1954. 32 pp. (11 by 8½ in.) with 45 photographs,

21 drawings, 3 maps, and postscript by Leonard Carmichael. 50 cents.

Song of the Sky. By Guy Murchie. Boston: Houghton Mifflin Co. 1954. 438 pp. (5 5/8 by 8 3/8 in.) with more than 100 drawings, including text decorations and endpaper sketch maps on "Winds of the World" and "Magnetic Variations of the World," and index. \$5.

Wings: Insects. Birds. Men. By Blanche Stillson. Indianapolis and New York: The Bobbs-Merrill Co. 1954. 299 pp. (5 7/8 by 8¾ in.), with 18 drawings by Kenneth Gosner, "geological timetable," glossary, bibliography, and index. \$3.50.

Savage Mountain

K2, The Savage Mountain. By Charles S. Houston and Robert H. Bates. New York: McGraw-Hill Book Company. 334 pages. Illustrated. \$6.00.

In this book the armchair mountain climber may read of the Third American Karakoram Expedition of the summer of 1953, the members of which challenged the world's second highest mountain—K2. The two main authors have divided up the chapters, with one chapter each supplied by Robert W. Craig and George I. Bell. This is a dramatic, heroic and intensely fascinating story of high adventure.

Briefly Noted

Art in Science. New York. 1954. Simon and Schuster. A portfolio of 32 paintings, drawings and photographs from *Scientific American*. \$6.00.

The Care and Feeding of Garden Plants. Washington, D.C. 1954. The National Fertilizer Association. 184 pages. Illustrated. \$3.00. A book on how to identify and remedy plant hunger symptoms in lawns, trees, shrubs, fruits, vegetables and house plants. Written by 14 authorities and published jointly by The American Society for Horticultural Science and The National Fertilizer Association.

Pelican off Route

From Grand Rapids, Michigan, Mrs. Earl K. Hall reports the fate of a pelican that got off its route and, in early November last year, landed in the chilly waters of Wolf Lake, Lake County, Michigan. It was emaciated, but, when captured and fed four large minnows, showed some interest in life. Later attempts to save the bird were made at John Ball Park Zoo, but these failed and the bird will be mounted at the Grand Rapids Public Museum by Frank Dumond, who says that this is not the first instance on record.

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Timber! Timber!

Timber in Your Life. By Arthur H. Carhart. Introduction by Bernard DeVoto. Philadelphia. 1955. J. B. Lippincott Company. 317 pages. \$4.00.

There have been published, throughout the years, a considerable library of books dealing with our forest resources, their use and conservation. Even so, there is need of this book by this conservationist-author, who can present an issue of basic importance both popularly and factually, and without "pulling a punch." He is abetted in this by a strong introduction by Bernard DeVoto, who never pulls a punch, either. The author reviews the history of our timber resources as a basis for consideration of where we find ourselves today. He points out: "The whole movement toward sound timber conservation stems from the creation of the national forest system. The fight to establish them was the crucial action that turned the nation's indifference to reckless exploitation of all natural wealth to conservation in all phases." Mr. Carhart discusses progress in forest management in simple terms, and the relationship of the forest and its perpetuation to other renewable natural resources. This is a book that should be required reading in every high school in the country as a part of social science courses.

Weather

Our American Weather. By George H. T. Kimble. New York. 1955. McGraw-Hill Book Company. 322 pages. \$4.75.

Innumerable questions are answered in this interesting and popularly written book by a geographer and meteorologist. The author has adopted a different approach from that used in most weather books written for popular consumption. He treats with weather month by month, and geographically within the month. You find the answers to such questions as whether it is ever too cold to snow; whether lightning strikes the same place twice; what is St. Elmo's fire; what the odds are on a white Christmas. A most interesting and informative book, this one.

Exploring Mars

Exploring Mars. By Robert S. Richardson. New York. 1955. McGraw-Hill Book Company. 261 pages. Illustrated. \$4.00.

Possibility of life on another planet, particularly Mars, is an intriguing speculation to many laymen and a serious preoccupation for no few astronomers. One of these astronomers is this author, who is on the staff at the Mount Wilson and Palomar Observatories. Along with study of Mars goes research into the possibilities of interplanetary travel. In this interesting popular discussion of what is known and what is thought about the red planet, and the problem of reaching it, Dr. Richardson gives us a thoroughly fascinating and importantly informing book.

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Darwin and Theology

Charles Darwin and the Golden Rule. By William Emerson Ritter. New York. 1954. Storm Publishers, 80 East 11th St. 400 pages. \$5.00.

Here is a book that must—and should—be read in its entirety. It is impossible to review it briefly, and it would be difficult to assay its great value and interest, even at considerable length. When William Emerson Ritter, noted zoologist, died in 1944 he left five book-length manuscripts and other unpublished writings. This volume is one of those manuscripts, and it has been compiled and edited in masterful fashion by Edna Watson Bailey, long a friend and collaborator. She has supplied an excellent introduction. In the first part of the book the author writes of Darwin and Darwinism; and the relation of both to theology. In the second part of the book the author moves into areas of philosophy into which Darwin did not venture. But the whole is more than just a study of Darwin, or an examination of the author's own philosophy of life. If there is one quoted paragraph that could come close to indicating a theme it would be the following:

"If the development of our race and our civilization goes on normally, Man will reach a synthesis of himself far more thorough-going than any yet attained; he will consolidate himself, will get together his powers and faculties, will reach a degree of integrity as yet only foreshadowed. He will see how much larger a being he is than his intellect; how much more he can be and do by putting his whole self, his feeling, his emotion, his sentiment, as well as his mind and will, into his work. In that day popular sentiment will not hold all obscure creatures as utterly good-for-nothing; will not hold every worm, every spider, every snake forejudged and forecondemned as a poisonous 'horrid thing.' There will be a general disposition to fair play toward all things that live; a desire to treat each according to its merits; to kill it humanely if it prove really harmful, or if undoubted benefit may come from so doing; but otherwise to allow it to go its way."

Anglers and Insects

An Angler's Entomology. By J. R. Harris. New York. 1954. Frederick A. Praeger. 268 pages. Illustrated in color and black and white. \$5.00.

"I have endeavored to write a book for the angler-naturalist, that is, for the angler who is interested in natural flies," says the author in a preface to this interesting book. "Interest in the natural water flies is not only one of the most intriguing of the side studies which combine to make the art of angling so everlastingly interesting, but it is of obvious practical importance to the fly fisherman who desires to improve his skill as an angler."

Desert Animals

Animals of the Southwestern Deserts. By George Olin. Globe, Arizona. 1954. Southwestern [Monuments Association]. 112 pages. Illustrated by Jerry C. Cannon. \$1.00.

This is the latest publication of Southwestern Monuments Association. It is written for the layman to introduce him to the mammal life of the Southwest's deserts. It contains full descriptions and observations of the life habits of fifty-four species of the Lower Sonoran deserts. A second book, treating with the mammals of the higher elevations of the Southwest, will be published within a year.

Southern Forestry

Manual of Southern Forestry. By Howard E. Weaver and David A. Anderson. Danville, Illinois. 1954. The Interstate Printers and Publishers. 368 pages. Illustrated. \$3.75.

As is indicated by the title, this book is regional in its application even though factually the information it contains is of wider interest. The authors recognize that forest products provide an important part of the income of many communities in the South. Therefore, courses in vocational agriculture supply, or should supply, more adequate forestry instruction. In their text the authors seek to provide teachers and students in this field, and others interested, with current information in simplified form as it bears on the various phases of forest management. This is a grassroots, practical book, and a valuable and helpful contribution to forestry texts.

Gardening with Nature

Gardening with Nature. By Leonard Wickenden. New York. 1954. The Devin-Adair Company. 392 pages. Illustrated. \$4.95.

In this book the author, a noted chemist, tells how to grow vegetables, fruits and flowers by natural methods, or according to the dictates of organic agriculture. For twelve years Dr. Wickenden has been putting into practice the basic teachings of Sir Albert Howard in this field. This is common sense agriculture, and this book presents it in simple terms that can easily be understood and applied.

Tropical Fishes

Tropical Fish in the Home Aquarium. By Horace Vondys. New York. 1955. The McBride Company. 157 pages. Illustrated. \$3.00.

This is a popular guide to the establishment and maintenance of the home aquarium. The first half of the book is devoted to the aquarium and the creation of the proper environment for its future inhabitants. The second half discusses the different species of fishes and their care. There are several plates in full color, and an appendix lists the names and addresses of aquarium societies.

Last Chukker

Last Chukker. By J. K. Stanford. New York. 1954. The Devin-Adair Company. 79 pages. \$2.00.

Several years ago J. K. Stanford wrote an exciting little book called *The Aul-Birds*, a story of a battle to keep egg-collectors from preying upon the nests of scarce avocets in Britain. This present little book is equally exciting, but its locale is Burma, with polo, smuggling, dangerous men and dangerous animals included. The author spent many years in Burma and knows whereof he writes, and writes delightfully.

Briefly Noted

Relativity for the Layman. By James A. Coleman. New York, 1954. The William-Frederick Press. 131 pages. \$2.75. A simplified account of the history, theory, and proofs of relativity.

The Lost Villages of England. by Maurice Beresford. New York. 1954. The Philosophical Library. 445 pages. \$12.00. Many ancient villages on the English countryside failed to survive and this author describes them and the reasons for their fate.

Endothelium. By Rudolf Altschul. New York. 1954. The Macmillan Company. 154 pages. \$3.50. The author says that one "is as old as one's endothelium" and discusses its development, morphology, function and pathology.

The Temple Tiger. By Jim Corbett. New York. 1955. Oxford University Press. 197 pages. \$3.00. The latest of five books by this author dealing with his adventures and experiences among the people and jungle creatures of India.

Fun with Game Birds. By Fred Everett. Harrisburg, Pa. 1954. The Stackpole Company. 287 pages. Illustrated in color and black and white by the author. \$7.50. An attractive book about the hunting experiences of a writer-artist-outdoorsman.

Development of the Guided Missile. By Kenneth W. Gatland. New York. 1954. Philosophical Library. 292 pages. Illustrated. \$4.75. A second edition of this book on guided missiles and rockets for war and peace.

Concise Dictionary of American Grammar and Usage. Edited by R. C. Whitford and J. R. Foster. New York. 1955. Philosophical Library. 168 pages. \$4.50. Definitions and comment on grammatical usages.

Jet. By Sir Frank Whittle. New York. 1954. Philosophical Library. 320 pages. Illustrated. \$6.00. The story of a pioneer in the field of jet-propelled planes.

Concise Dictionary of Ancient History. Edited by P. G. Woodcock. New York. 1955. Philosophical Library. 465 pages. \$6.00. The title is descriptive.

Chicago the Pagan. By Weimar Port. Chicago. 1954. Judy Publishing Co. 175 pages. Illustrated. \$3.00. An informal guidebook to Chicago.

Contents Noted

ENFORCEMENT of the game laws is a State responsibility, except when migratory species are concerned. Then enforcement becomes equally a Federal responsibility. We have recently been treated to the latest example of game law violation in the State of Maryland. An important duck hunting State, Maryland chose to differ with Federal regulations, which ban shooting migratory waterfowl over waters baited with food. State regulation permitted baiting so long as the baited waters were at least two hundred yards from a duck blind. Federal enforcement agents of the U. S. Fish and Wildlife Service set about to enforce its regulations in Maryland, arresting many duck hunters for shooting over bait, which, in many instances, was placed in violation of State regulations, also. The Federal authorities are to be applauded for vigilance in carrying out a locally unpopular responsibility. Among the violators, enforcement agents apprehended two officials holding high positions in conservation agencies. They found them not only baiting, but in possession of more birds than the limit allows. Violations on the part of alleged sportsmen seem a reflection on all gunners who observe the rules of the game. But when gross violations are charged against conservation officials—and admitted by them through their prompt forfeit of collateral—then all conservation leadership suffers a severe blow.

THE Shocking Truth about Our National Parks" is the title of a hard-hitting article in the January, 1955, issue of *Reader's Digest*. Through the wide circulation of this publication and the dissemination of reprints, problems facing the National Park Service are effectively emphasized to a wide audience. One point that is stressed, and should be repeated often, is that less than one half of the nearly \$43,000,000 appropriation for the Service goes "for the operation, maintenance and protection of these parks as wilderness areas." Recreational areas, parkways and such, not properly a part of the Park System, drain off a disproportionate amount of the appropriation, and demand too much of the energies of the Service personnel. The *Reader's Digest* article devotes a great deal of attention to Yosemite and Yellowstone National Parks, perhaps unfortunately leaving the impression that all of the parks and monuments are as afflicted as are these two areas. This is not the case, of course, for such parks as Glacier, Olympic, Teton, and others, have escaped too intensive exploitation, even though they do suffer the neglect inherent in inadequate funds. Another impression left by the article should certainly be corrected. It is said: "If motor visitors to Yellowstone during 1954 had paid just \$1.27 each toward what they received, instead of 75 cents, and those to Yosemite 95 instead of 62 cents, they would have paid the entire annual cost of the two parks." It should

be pointed out that every cent of revenue received by the National Park Service goes into the Public Treasury, and it would be just as difficult to get proper appropriations from Congress regardless of what motor visitors to Yosemite and Yellowstone might pay.

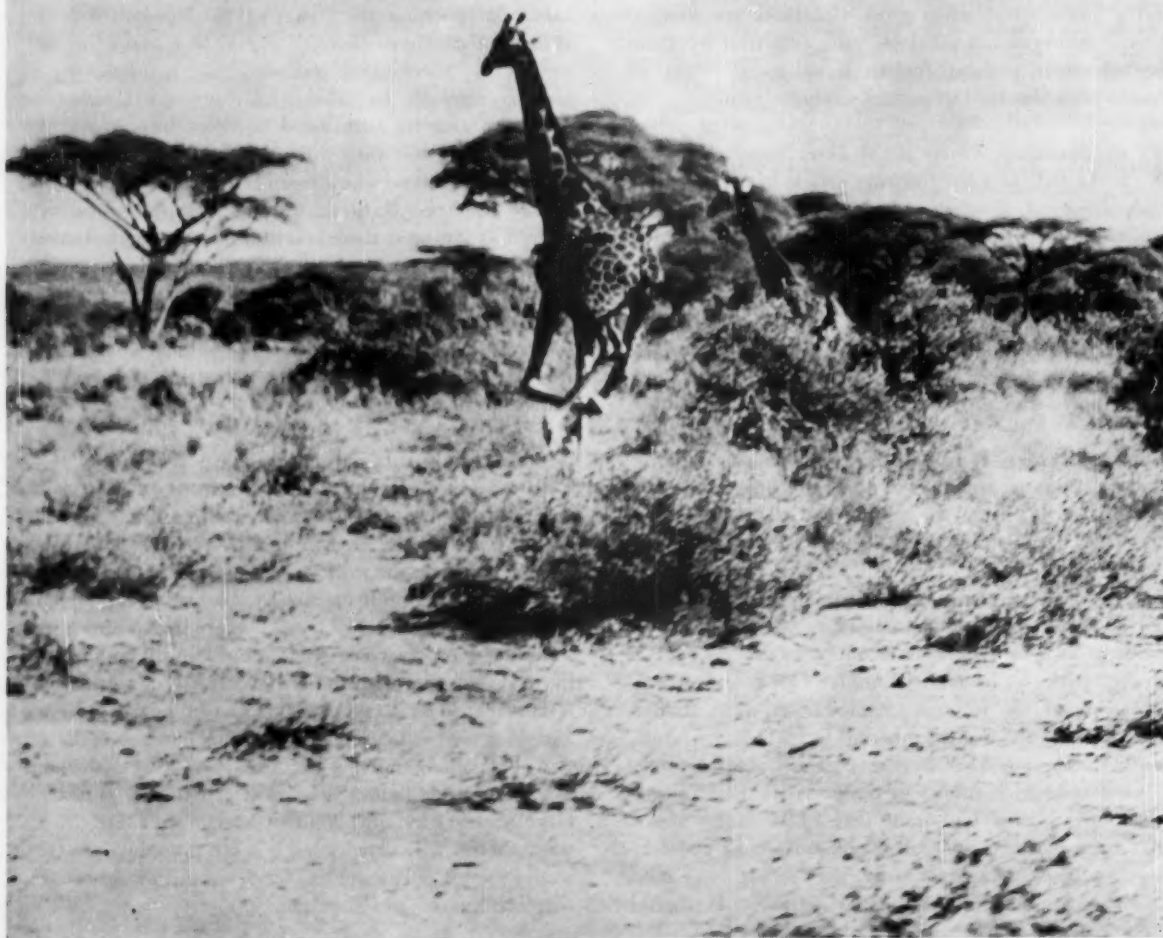
LAST November 22 the United States Supreme Court handed down an important decision, which was written by Justice Douglas. It concerned the case of *Berman vs. Parker*, and dealt with a slum clearance project in connection with which a property-owner contended that, under the Constitution, he need not yield to zoning. Pointing out that the issue revolves around "what traditionally has been known as police power," Justice Douglas says that its definition "is essentially the product of legislative determinations addressed to the purposes of government, purposes neither abstractly nor historically capable of complete definition. Subject to specific constitutional limitations, when the legislature has spoken, the public interest has been declared in terms well-nigh conclusive. In such cases, the legislature, not the judiciary, is the main guardian of the public needs to be served by social legislation. . . . The concept of the public welfare is broad and inclusive. . . . The values it represents are *spiritual as well as physical, aesthetic as well as monetary*. It is within the power of the legislature to determine that *the community should be beautiful as well as healthy, spacious as well as clean, well-balanced as well as carefully patrolled*. In the present case, the Congress and its authorized agencies have made determinations that take into account a wide variety of values. . . . If those who govern the District of Columbia decide that the Nation's Capital should be beautiful as well as sanitary, there is nothing in the Fifth Amendment that stands in the way." The italics are ours, and the points are thus emphasized because they apply equally to the public's right to protect the environment of its highways from invasion by billboards and businesses, which impair beauty, threaten safety, and destroy other values.

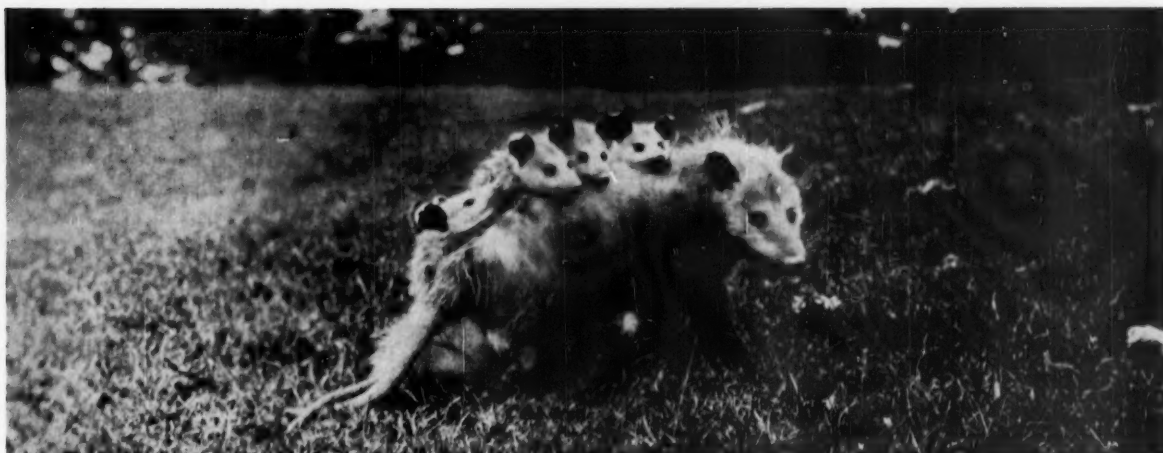
A CASE in point, with relation to the above, is at issue in Maryland. The environs of Route #1, from Washington to Baltimore, were so invaded as to make it one of the most hideous and hazardous highway stretches in the world. Now there has been opened a new parkway, built in part by the State of Maryland and in part by the Federal Government, under the National Park Service. It is a beautifully engineered, divided parkway with limited access. Its environment is landscaped and lovely. But the billboard industry and highway enterprises are casting envious eyes on this unspoiled route. In Annapolis the Maryland Legislature has before it a weak bill that would keep structures of any kind 200 feet back from the right-of-way. What is really needed is a strict zoning law that would permit only essential services, and would control their character and location. R.W.W.

African Landscape

By GERHARD FRIEDRICH

Twelve miles due west another stifling day
Burns to its gaudy end, as darkness falls
On Kenya and Uganda. Now giraffes
Plant their grotesquely graceful silhouettes
Against the sunset; herds of elephants
Advance their stately forms beyond the rim
Of jungle thicknesses; lean leopards, long-
Lapped in their leafy solitudes, ge
From their green, waking dreams, while zebras taste
Blood on the red horizon. Then a breeze
Shivers the continent, and suddenly
A rash rhinoceros, with brittle horn,
Charges the fading scene to register
His prehistoric disapproval in
Fantastic snorts. Far off hyenas cry.





Animals that have body pouches, which might be called "built-in" nurseries, are called marsupials. The opossum is the only marsupial in the United States.

Mothers of the Wild

By ALAN DEVOE

HIDDEN in a hedgerow, in the fragrant summer dusk, I had twice seen a cottontail rabbit come hopping cautiously to the same spot among the tall grass stems. On our first meeting she had remained there, invisible, for nearly an hour. The second encounter was shorter, but long enough to make me positive about the guess I had made. There must be a nest of baby rabbits there.

But how could there be? After seeing the rabbit's first stealthy visit, I had crossed and recrossed that area of the field, staring at every foot of the ground, but found nothing.

Now, marking the point with my eyes and never losing sight of it, I again began slowly combing the tall grass. Suddenly, in the dim light, I saw a tiny stir of motion, as if a patch of earth beside a tussock had moved. I bent down. What had seemed to be only a bit of grass-grown earth was actually a tiny, soft, felted blanket. Gently I lifted the little coverlet. Tucked under it were four rabbit babies.

I had learned mother rabbit's secret. The blanket was a quilting made of her own fur and matted wisps of grass. Every time she left her youngsters in the nest after a feeding, to go off through the summer fields on her own errands, she pulled this warm, soft covering over them, leaving them perfectly hidden and secure against the evening chill.

This practice is only one of many wonderful devotions and ingenuities by which mothers of the wild bring up their little ones. Baby mammals are born in all sorts of situations—caves, burrows, hollow trees, nests made as cunningly as birds'. Whatever the circumstances, the wild mother has the mother-wit to

give them the special care they need, and a mother-love that lights the world of woods and fields with one of its loveliest radiances.

Nature's simplest nurseries are "built-in" ones; the body pouches of animals called marsupials. Kangaroos belong to this category. So does the koala, Nature's real-life teddy bear. So do opossums. Marsupial babies are born incredibly tiny. A big kangaroo stands man-high and may weigh 200 pounds; but some of mother 'roo's little ones at birth are only an inch long. An opossum's baby is as small as a bee and weighs only two grams.

Tiny and undeveloped as they are, marsupial babies instinctively head for the nursery pouch. The mother watches intently, ready to give a fondly helping nudge. Sometimes she licks a smooth path across her fur to make the way easier for her tiny traveler. With her brood safely cradled—a single baby in the case of kangaroos, a family of as many as eighteen for mother 'possum—she uses special muscles to pull the pouch securely closed.

As baby marsupials grow up, their mothers use many protective ingenuities for their care. When "Joey" (as Australians call a kangaroo youngster) is old enough to leave the furry nursery periodically, and hop along beside mother, any sudden appearance of a pursuing enemy sends him diving back head-first into the pouch. He rights himself, peeps out, and mother instantly takes off on a jouncing race to safety. If the hunter is gaining, her one thought is for little Joey. Dodging for a second into underbrush, or behind a boulder, she furtively flips him out. Then she leads away the enemy, mile after bounding mile.



Mother koala dwells in the treetops and carries her single offspring picka-back. When weaning her young she prepares a special "formula" of eucalyptus.

Only when she is sure she has shaken off pursuit does she come back circuitously and rescue her charge from his hiding place.

When mother opossum's babies' nursery days are over, she ensures their safety by carrying them as passengers on her strong, furry back. The bright-eyed, sharp-nosed little fellows hook their chins over her backbone and hang on tight to her pelt. Sometimes she arches her long tail over her back and lets the children wind their little tails around it. This educates

them in the use of a prehensile instrument that will mean a lot in their opossum lives when they are old enough to leave her and shift for themselves.

Mother koala, dweller in treetops, sometimes 150 feet above ground, also carries her single offspring picka-back. She has a special problem when the time for weaning comes. Koalas live exclusively on the strong, pungent leaves of eucalyptus. To enable baby koala to make the transition from milk to this adult fare, the animal mother uses one of the strangest physiological processes in Nature. Temporarily her body makes a sort of eucalyptus "pap." She produces this unique baby food only for a month or so, only every two or three days, and only at a special time in the afternoon.

Animal mothers that do not have "built-in" nurseries make many kinds of nests and dens to give their babies security. But some species, because of their ways of life, cannot provide such a birthplace and must resort to methods all their own. A mother bat arranges her childbirth by hanging upside down by all four feet and spreading her wings and body to make a receiving cradle for the youngster. While her baby is still small and helpless, she carries him everywhere with her on her flights through the darkness. He holds tight to the fur of her breast with his milk teeth.

Water-dwelling animal mothers, like aerial ones, have special childhood problems. Mother porpoise's technique has been observed and filmed within recent years by scientists at the Marine Studios in Florida. She gives birth to her baby under water. This is fraught with danger, for porpoises are air-breathers. His mother must be sharply alert and act with instant promptness. The scientists have found that she frees

her baby from his birth-cord and launches him into life "on his own" with such amazing speed that he shoots to the surface and is breathing air within ten seconds of birth.

Mother gorilla builds a suitable tree-cradle of leafy boughs, so located that father gorilla can keep it constantly under watch from a shelter he constructs at the base of another jungle tree nearby. But all sorts of other animal mothers,

Tucked under the soft, felted blanket were the rabbit babies.

PHOTOGRAPH BY W. BRYANT TYRRELL



down to very small ones, are just as painstaking, each in her way.

Mother polar bear tunnels out a nursery in the snow; perhaps at the foot of an iceberg. At the end of the snow tunnel she scoops and shapes a comfortable cub-room, as secure against the Arctic blasts as the inside of an igloo.

Mother coyote takes over the abandoned burrow of a badger, woodchuck, or some other digging animal, and renovates it especially for her babies' needs. She cleans it out and enlarges it, and equips it with an air-hole that provides cross-ventilation.

In fashioning underground nurseries, even such small mothers of the wild as meadow-mice and gophers are scrupulous about constructing special "sanitary rooms." Animal children are trained early to obey the law of cleanliness. I have dug up many nurseries in which various four-footed little ones have started their adventure of life—snug little rooms lined with leaves, made soft with fur. To find a messy one has been a rare exception.

One of the most delightful nurseries is the work of the common white-footed mouse. Mother mouse gathers fine grasses, rootlets, shreds of soft leaves, strips of pliable cedar bark. Working and reworking the material, fluffing and kneading it, she weaves an almost perfectly spherical ball. At one side she leaves an opening just large enough for her to squeeze in. Darting in and out, she performs innumerable turnarounds, hollowing a cozy chamber in the center of the ball. She lines it with the softest materials she can find, bits of moss, wisps of plant-down. The finished nest is at last given a final extraordinary detail—mother mouse makes a door-stopper. In bitter weather, or when she is away from her babies, this tight little plug of grass is inserted into the doorway, closing it against any intrusion of foes or weather.

Bringing up animal children involves a constant round of motherly attentions. Feeding, washing, sanitary care in early babyhood—these are by no means all. Few animal mothers are able to wean their offspring as effortlessly

Mother flying squirrel taking the babies into a new nest. When they are ready, she has to push them off a limb to teach them to glide.

PHOTOGRAPH BY WRAY H. NICHOLSON



Marsupial babies are born incredibly small, and some kangaroo babies at birth are only about an inch long.

as mother koala. This was impressed on me the first time I had a fox den under observation.

When the four cubs seemed old enough to be graduating to solid food they would gather eagerly around



their mother, pawing and pestering, every time she arrived home with game. It struck me that she was a hard-hearted, selfish sort of mother, for she always seemed to bolt the morsels herself. Careful watch with binoculars revealed what she was really doing. She would tear apart the prey she had brought, chew it carefully to eliminate indigestibles, and then with a quick gesture scatter it on the ground for the youngsters.

A heroic chore that falls to the lot of many animal mothers is the task of moving the family. Squirrel mothers, delicately sensitive to impending weather changes, often decide they must leave a frail old hollow tree when they sense a bad storm coming. One by one the youngsters are picked up, mother squirrel slinging them upside down under her chin, gripped by their stomach-fur in her teeth, and the difficult transfer is made to a new and safer

location, perhaps at some distance from the first site.

Cat mothers of all kinds usually carry their children by the napes of their necks. When a mother bear must transport her cub she uses a peculiar method that looks alarmingly dangerous. She seizes the young one's entire head in her mouth. Somehow she is so gentle that she does not harm the baby.

Young animals must learn life. Instincts must be perfected, native skills brought out, and a whole outdoors education imparted in the brief days before they go on their own. Animal mothers are responsible even for imparting many lore that we may imagine to be inborn.

Grownup seals seem as at home in the water as do fishes, but baby seals, born on the rocky headlands, have to be taught to take to the water and swim. Pleading, persuading, enticing, mother seal generally ends up by *pushing* her reluctant young one adrift. Mother otter, too, must induce her offspring to learn the art of their "native" element. She often resorts to motherly trickery. With a youngster on her back, she swims out quietly into the channel of a stream and then suddenly submerges.

Mother flying squirrel must push Junior off a tree branch, to get him to learn gliding. Mother bear cuffs her cub to teach him to come when she calls.

Mother deer butts and bunts lessons in quietness into her fawn. Mother cat boxes her kittens' ears for slowness and inattention in the art of mousing. (Kittens are not mouse-catchers instinctively, they must

learn it from mother. Naturalists find that kittens raised without a mother to train them do not recognize mice as prey. They often make friends with them, and sometimes are afraid of them.)

Animal mothers use endless devices in teaching and training. Harsh discipline is the rarest of these. Chiefly they teach by drawing their youngsters into creative play. Mother lioness twitches the tip of her tail, inducing her children to pounce on it. Mother raccoon flips frogs and crayfish to her young ones, on evening excursions by the brook, letting them make a game of what will later be serious business.

Perhaps the most moving of all such devotions is the

superb courage of mother animals in giving protection.

I have seen a mother woodchuck, when a farm dog was pawing furiously at her burrow to dig out the babies from the nursery, throw up barricades of earthworks as fast as the big, powerful dog could dig. Down would go one barricade. Within seconds she would have flung up another. Then another, another, another, yielding the tunnel only inch by hard-fought inch. I thought her heart would burst, but it was the dog that grew exhausted first, and left, defeated.

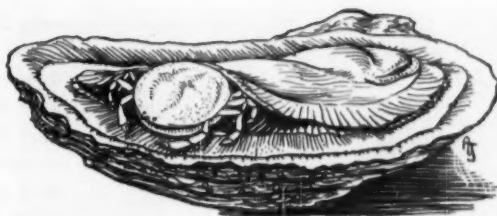
I have seen a tiny chipmunk mother stand firm against a weasel, rearing up on her hind legs, boxing, lunging, snapping, until the most implacable killer of the fields and woods had enough. I have seen a white-footed mouse mother, smaller than my thumb, whose nursery in an old bird-house I had inadvertently disturbed, make six laborious trips, within two feet of me, carrying her babies one by one to safety. She was fairly shivering with fear; but there are things even in a mouse's world that are greater than fear. Five times she came back to the endangered nest, almost under my hand, and rescued every baby of her brood. For conversational purposes we speak of valor that is like that of a tigress with her young, or a she-bear with her cubs. Actually that blaze of heroic devotion burns in every mother of the wild, even the least.



Mother white-footed mouse constructs a comfortable home for her babies, either starting from scratch or appropriating a bird's nest, as in the case of this wood thrush's nest.

GRACKLE By RAY ROMINE

His black's attractive—granted, but
I for one can't stand his strut!



DRAWING BY ALICE JANE MANSUETI

The oyster crab, *Pinnotheres ostreum*, is a parasitic species that lives within the shell of live oysters during its late young and adult stages. In diameter, it rarely exceeds the size of a lima bean.

The Oyster's Messmate

By ROMEO MANSUETI

Photographs by the Author

EATING raw oysters on the half-shell is a gourmet's delight throughout much of the world. Still alive when shucked, the oyster causes few oyster-eaters to flinch as they gulp down the beast,

entire. However, I once observed more than flinching at an oyster feast. The laughter and gustatory pleasure at a raw bar was rent by the shout of a robust, red-faced man.

"What's this?" he thundered.

He peered intently and wide-eyed at the oyster, holding it and its shell close to his nose. His face, formerly wreathed in smiles, showed horror and disgust.

"There's a spider in my oyster," he declared, incredulously.

Those who crowded around saw a flesh-colored, moist blob, about the size of the end of one's thumb. It moved slowly and mechanically next to the oyster's body. In fact, to some, it appeared to be part of the mollusk itself. As if embarrassed by its own nakedness, the creature attempted to move with its spidery legs, which seemed too weak to propel it.

The man held the oyster shell gingerly between thumb and index finger, preparing to drop it. Suddenly a small, deeply tanned man elbowed his way in. He plucked the messmate from the oyster's bosom, held it in the air for a second to impress the onlookers that it was alive, then dropped it deftly into his mouth. He chewed it in an

exaggerated manner, at the same time acknowledging the surprised reactions of his friends with broad smiles.

"It's nothin' but an orster crab," he said. "They won't hurt you, and they taste just as sweet as a nut.

We get 'em all the time in orsters down in Virginia."

A confused conversation followed, but little more was gleaned about the animal that night. Nevertheless, this was my first introduction to the oyster crab, known as *Pinnotheres ostreum*, a small crustacean that lives inside the shell of some live oysters.

I thought no more of the incident until I attended an oyster roast at the Virginia Fisheries Laboratory at Gloucester Point three or four years ago. There, the reaction to oyster crabs was most casual. Everyone was eating them raw with the oysters, and everybody seemed to know all about them. I was quickly indoctrinated to the style of eating for I also shucked my oysters, ate them without any qualms, including an occasional oyster crab. At the same time I milked the biologists for information about the "orster crab."

My first question was, "how do the crabs get inside the oyster's shell, and what are they doing there in the first place?" "Oh, that's easy," one man volunteered, "When the oyster crab spawns—that is, the adult female crab inside the oyster—the larvae hatch from eggs



For many years the oyster crab was regarded as a "commensal", that is, a messmate or partner, one that did not harm or was not harmed. Recent investigations have shown that, when numerous, the crabs can cause serious damage to oysters. Oysters rarely contain more than one adult crab, the size of which is shown above, but as many as 200 or more of the tiny, tick-like, invasive first crab stage can be found in heavily infested individual oysters.



The oyster crab is prized by gourmets as a sweet-tasting and delicious food to be eaten raw. Here the wife of the author is preparing to eat a live oyster crab that has just been shucked from an oyster. Oyster crabs can also be eaten in special oyster crab stews, or as an addition to oyster stews.

and pass out into the surrounding water that is pumped in and out by the oyster. Can't tell you much about its sexlife, because nothing is known. The minute young pass through several developmental stages common to all crabs. After hatching from the egg, the zoea, which is a free-swimming stage, becomes part of the zooplankton of the water. It then develops into the megalops, or second larval stage. That's where the oyster figuratively comes in, but where the crab literally steps in. We then call the crab, 'intruder in the shell.' "

He paused, slurped another oyster, and continued, disregarding my slightly confused expression.

"When the speck of a larva reaches the first crab stage, it strikes, and the oyster has had it. Actually, the oyster is probably little disturbed by his unwelcome house guest. This infective stage invades the oyster along with food and water that is normally pumped into the mollusk. It is hard, flat and hairy; rather looks like a tick. During this stage it enters the oyster's abode for the rest of its life. It grows and develops on the oyster's gills."

The biologist mentioned the work of Dr. Leslie A. Stauber, a Rutgers University biologist who conducted a unique experiment to test the theory that these invasive, first-stage crabs actually enter the oyster. An oyster, dredged for market, was placed in an aquarium with 150 first-stage crabs. These were scattered over the dish at the start. Within a short time many were seen lined up around the oyster, from hinge to bill, but mostly at the places where the two valves come together. Seven days after the start of the experiment

only 25 live, and 20 dead, crabs were found in the dish. The oyster was then opened. A total of 49 live crabs were found in the left valve, and 26 were found on the ventral side of the oyster, mostly on the gills. The balance of the crabs were scattered elsewhere on the oyster's anatomy.

We paused for a moment to observe a large crab—about the size of a lima bean—that had been exposed in the shucking of an oyster. A few seconds later it disappeared down the gullet of a newspaper reporter.

The biologist was really wound up by now. He told us that the beast has caused a minor headache among biologists regarding the proper classification of its association with the oyster. For many years it was regarded as a "commensal," that is, one that did not harm, or was not harmed by, the animal with which it lived. Dr. Stauber, while working in Delaware Bay prior to 1945, thought otherwise. In a detailed study of the oysters harboring these small crabs, he found that the latter can apparently cause

serious damage to the gills and mantle of oysters. He discovered one oyster harboring 262 small, early-stage oyster crabs, but, strangely enough, he never found two or more female crabs of later stages in one oyster. He observed that certain Delaware Bay oyster bars suffered heavy losses from this cause. Consequently, few naturalists were surprised when Dr. Stauber indicted the oyster crab as a parasite. The famed Dutch oyster biologist, Dr. P. Korringa, concluded, however, after considering Stauber's evidence, that the difference between a commensal and a true parasite is rather vague and arbitrary when applied to the oyster crab. However, oyster culturists and oystermen, who formerly gave this creature no more than a passing glance, now regard it with great interest.

The biologist at the Virginia Fisheries Laboratory pointed out that oysters in the lower Chesapeake Bay are more often infested (30 to 40 percent have these parasitic crustaceans) than those from the upper Bay in Maryland. Oysters containing crabs appeared to be in poorer condition than non-infested individuals, although there was no evidence of oyster mortalities traceable to the oyster crab. Salinity appears to be an important limiting factor in the distribution of the crab in Chesapeake Bay, the greater number being found in the saltier areas. On the Atlantic Coast, it is distributed from Massachusetts to Florida and the West Indies.

When and at what stage in the development of the oyster these crabs invade their host is a question that is not easily answered. A partial solution is suggested

The oyster crab prefers to attach itself to the gills of live oysters. It "robs" the oyster of its newly collected food by reaching beneath its abdomen with its claws, and also disengages the tangled masses of mucus and food caught in its legs. This form of larceny leads to oyster injury that can reach serious proportions. Certain Delaware Bay oyster bars suffered heavy losses from injury to the gills and mantles of oysters by the oyster crab.



by information supplied by an oyster-growing and packing house at Solomons, at the Patuxent River mouth. Oyster seed, which means small live oysters clustered on old, dead shells, are obtained from the saltier James River in Virginia, and transplanted for growth and harvest several years later in the Patuxent River. When shucked after harvest, these oysters contain a significantly higher percentage of oyster crabs than found in oysters native to the lower Patuxent. Oystermen regard these as crabs that originated in the James River, and apparently are retained by the growing oyster in spite of the lower salinity. Obviously, some oyster crabs probably invade their host when the latter is quite small and immature.

The oyster crab was described by Thomas Say in 1817, but finding a male oyster crab, eluded biologists for many years. In fact, one of the classic mysteries of invertebrate zoology has been the occurrence and distribution of the male crab. Dr. Mary J. Rathbun, the world-renowned crab specialist, in her study of the oyster crab and its relatives more than forty years ago, found only two males among more than 100 females in the collection of the U. S. National Museum. These specimens were from many localities, and were taken at various seasons. This prompted most scientists to speculate that it was a small, free-swimming crustacean that simply eluded all the known methods of capture. Dr. Stauber's announcement, in 1945, of finding 144 males caused a minor sensation in shellfishery association circles. The males proved to be very tiny, roughly one-fifth the size of an adult female. They were also found living within the oysters, although there were considerably fewer males than females. One of the reasons for success in finding the males can be attributed to the unique method of collecting oyster crabs. In commercial packing of oysters, the latter are drained—in part to insure accurate measurement

of the volume of the oysters opened. This volume is the basis on which the shucker or opener is paid. The oysters are later washed and drained again before shipment. Catching the first drainings in pails, and then placing the material collected in shallow pans or dishes of salt water, allows the crabs, freed in the opening of the oysters, to be recognized readily and collected.

Few crustaceans lead such a bizarre existence. After entering the oyster as a minute, first-stage crab, the growth and development are characterized by degenerative changes. The eyes become smaller and virtually useless, the shell does not harden, and the limbs and claws remain soft and weak. The shell is translucent and is tinged with salmon pink or orange. Throughout the period of growth the parasitic stages of the crab moult within the bivalve, just as all non-parasitic crabs must do in order to grow.

In addition to the "parasitic" change, the oyster crab can also be accused of petty larceny. I have seen many crabs in shucked oysters since my first experience with them, and have noted that the crab is invariably found on the oyster's gills, frequently facing the incoming current. In fact, it does not mind being upside down for prolonged periods. It does not take food rejected by the oyster's palps, but it does take the oyster's newly collected food by reaching beneath its abdomen with its claws, and also disengaging the tangled masses of mucus and food caught in the legs. This form of robbery, therefore, leads to the oyster's injury.

The oyster crab has been the subject of "there's a cockroach in my soup" routine. One of the most amusing scenes that I have witnessed several times is one that is often enacted by a customer ordering oyster stew in a restaurant. If one or more oyster crabs are observed floating in the milk on the surface of the stew, an outburst usually follows, (Continued on page 162)



A prairie chicken cock photographed while booming. Note the erect tail, swollen air sac, pinnas pointing up and forward and the primaries extended along the legs.

Keep 'Em Booming

By ARTHUR BAKER and JERRY VOGELSANG

Photographs by Charles W. Schwartz

IT WAS an evening late in March. We were huddled around an ancient stove, not pot-bellied like the one known in our youth, but straight as the white oak sticks that burned within it. The pungent aroma of the burning wood showed friendly affinity to tobacco smoke as it drifted over the room. Only one voice could be heard.

"It's early, I know. But spring is early. We saw hens this morning, when I knew they shouldn't be in yet. So, if a hen enters the booming area, drop whatever you are doing and concentrate on her. We must have her band number if she is banded, as she may never come back. We will have many more chances on the bands of the cocks."

There was rapt attention to each word of explanation by Mrs. Hamerstrom, as she gave us directions about working the blinds in the morning?

Some of the group, from varied walks of life, had come considerable distances to watch the prairie chickens boom, and to learn a little of what the congenial Dr. and Mrs. Hamerstrom had been doing in their 15 years of research for Wisconsin's Department of Conservation in the Plainfield area of central Wisconsin.

"It is hard to believe," Dr. Hamerstrom had told us that afternoon, "but we have a denser population of birds right here than in any place in the United States; in fact, in the world. Several States have more

birds than Wisconsin, but not in such concentration."

"How large is the bird area here, Doctor Hamerstrom?" It was a genuine pleasure discussing chickens with the friendly scientist, and not only for the clear concise answers to our questions. Listening to his soft, well-molulated voice, one felt he showed the valuable quality of real interest in the people with whom he talked, as well as in the birds he loved.

Drawing on his long research with the chickens, he continued. "The birds' range is about 60 square miles, just north and west of Plainfield. But this statement is misleading. They avoid over-grazed areas, plowed areas, or woods, like the plague. The very nature of the bird for nesting demands high grass on flat land."

"What is the birds' greatest danger today?"

"Complacency," he said. And then he told us how complacency is the cancer to good conservation.

The sportsman shows it when he says, "Fellows, why do we pour money into research when we can't even shoot the birds? Give me pheasant every time; better all around." The farmer shows it when he comes up with, "What is all the fuss about? Been around these parts nigh onto 52 years. They was here then, and they still are. Reckon they will be when you and I'm gone, pardner." Even some conservationists display a complacency when they staunchly affirm, "When we find an acre of land not being used directly for farm production, that's the place to plant trees."



The prairie chicken hen, object of the attentions of the cock bird on the opposite page. She seems to be completely unconcerned by the frenzied activities of the male birds.

The hunter shows it by attacking the prairie in wave after wave of armed terror at the slightest legal opportunity.

It is hard to pin down the cause of complacency. Other educators must share with us part of the blame, for these complacent people are the product of our schools. And perhaps some of it is caused by people who hear that the Plainfield area has the most dense prairie chicken population in the United States.

But a valid reason for complacency is non-existent. We saw maps of the 60 square miles of prairie chicken country; the results of exhaustive research. There has been a loss in this territory of 5000 acres of good chicken cover from 1951 to 1953. This loss was due to acres turned over to extensive grazing, plowing, and, to a small extent, to weed and brush invasion. During the same period there was a gain in good bird environment of 1000 acres. Net loss—4000 acres in two years. There should be no complacency in the face of figures like that; with the stand of good prairie chicken cover disappearing at the rate of 4000 acres in two years!

"What will happen to these fine birds?" This question must have been in several minds as we crawled into sleeping bags upstairs in this old, pre-Civil War house. Here in the Plainfield area is a population of birds that, in a ten-year cycle, range from fifteen hundred to possibly five or six thousand birds. They are in serious danger.

Dr. Hamerstrom's call came at 4 A.M. We greeted a brisk morning with good coffee, bacon, and eggs. Sunrise on this late March morning was 5:37. Final directions were received, equipment was gathered,

and the big moment of the weekend was begun. The cars, balking at the cold of the morning, crept out to the highway.

We parked not more than 100 yards from the blind. Crossing the field, just as dawn was showing, we must have resembled prowling infantrymen loaded with cameras, binoculars, clip boards, paper, pencils, direction guide sheets, and a 20X Balscope for spotting and reading band numbers of birds far away in the booming ground.

Settled in the blind at 5:15, the first boom was heard just three minutes later. The birds were off to the west, about 50 yards, in short brush.

By 5:33 fourteen cocks had worked their way slowly to the booming ground and had assumed their positions. Each cock has a sharply defined territory, which must be constantly protected from encroachment by the cocks in adjoining territories. The booming, then, is interrupted by constant fighting.

The booming itself is marked by an exciting exuberance, but seems to lack boastful, strutting vanity. Occasionally a cock jumps a foot in the air. More often, the booming starts with a slight lowering of the head, followed by a drumming of feet on the prairie. This drumming starts quite rapidly and quickly reaches a crescendo, at which time the sound is a burr rather than having individual beats. This may last from a half-second to three and one-half seconds. Just as the drumming ends, the booming begins. The orange sacs, flecked with red on the anterior dorsal periphery, swell to great size, probably seventy millimeters in diameter, while the tail feathers point skyward as

straight and stiff as arrows. The long tufts of feathers on the forward-stretched neck rise up and even point forward. The primaries of the wing are spread and held firmly against the body and legs. Then the dramatic three notes of the boom come bursting forth, resounding for two or three miles. "Gal-darn-you" echoes, in deep resonant tones. These air sacs are not in the least responsible for the origin of voice, as was once thought, but do give the booming its distinctive tone.

We saw seventeen birds in all. Fourteen were in sight of the blind at all times. Several worked in to ten feet of the blind. At this distance 8X40 binoculars set the birds in your lap, adding greatly to the thrill of going booming.

This morning in the blinds came in late March, about two weeks early for much hen activity. No hens were sighted from the blind. The reports from the other blinds showed them present in small numbers. Observers reported a hen occasionally strolling majestically into the booming area. Her actions were marked by complete unconcern. She would stroll through the area, stop to pick up a blade of grass, and glide on as the frenzied activities of the cocks bid for her attention.

About 5:47 A. M. the birds showed a marked de-

crease in booming, and in 30 seconds there was complete stillness. The birds seemed frozen. After a few moments the birds began controlled activity, followed by another period of silence. These periods of controlled activity, followed by silence, continued until 6:02, when a male marsh hawk darted from the sky like a jet diving at one of the cocks. The cock barely succeeded in avoiding the swift plunge of the predator, who became immediately discouraged at his failure and flew away. So did the seventeen cocks. They made it back in ten minutes, however, to the bushes just west of the blind, and once more started slowly working into position in the booming area.

Mid-morning, Sunday, found us again huddled around the majestic stove, feeling good after our second breakfast. The stove gave off a pleasant and welcome warmth following the cold blinds. Even it was aiding the conservation of the prairie chicken. Its appetite for fuel made slow inroads on the surrounding woods, leaving welcome grass cover for our birds.

The Hamerstoms were hard to bid goodbye. They made one feel like wanting to settle in and help with the big job of preserving bird habitat; to be of some small help to the Hamerstoms, and Wisconsin's Department of Conservation, in "Keeping 'em Booming."

Handle with Care

PAPER experts at the U. S. Forest Products Laboratory at Madison, Wisconsin, are literally "handling with gloves" a shipment of wood sent air express from Pakistan for tests of its suitability for papermaking. The wood comes from the "blinding tree of India." Handled by the unwary, it can cause severe skin blisters and eye irritations. A milky white substance in the bark, similar to the latex obtained from rubber trees, is responsible.

Native Pakistanian and Indian woodcutters have long been accustomed to handling the tree and its logs with gloves. Once the bark is completely off and the wood seasoned, however, danger of irritation is past. The wood is used for construction, furniture, toys, and shipping boxes in the Orient.

To natives of its growth area the tree is known as geva or gangwa. Botanists call it *Excoecaria agallocha*. It is a member of the same family, *Euphorbiaceae*, to which the rubber tree, *Hevea brasiliensis*, also belongs.

The wood received at the Laboratory was dry and bark-free. Nevertheless, a day or two after Dr. B. Francis Kukachka, Laboratory wood identification expert, examined it he came up with a couple of skin blisters on one hand because of inner bark left on it.

It is planned to run pulping trials by various processes and make newsprint and magazine papers of the wood. Laboratory technicians are keeping their gloves on as they put it through various papermaking tests!



Dr. B. Francis Kukachka, wood identification expert at the U. S. Forest Products Laboratory at Madison, Wisconsin, examines a bolt of geva wood from Pakistan.

The Pejibaye Palm

By CHARLES B. HEISER, JR. and
JORGE LEÓN

Photographs by the Authors

AMONG the flowering plants, the palms make important contribution to the welfare of mankind. The coconut and the date palms are well-known examples, but there are many other palms in the tropics that are as yet little appreciated in temperate regions. In the small, Central American Republic of Costa Rica one of the most respected palms is the peji-baye, *Guilielma gasipaes*.

The peji-baye, or pupunha, which also bears numerous variants of these names, is found sporadically from Nicaragua to Bolivia and Brazil, but in no country does its fruit have the popularity that is accorded it in Costa Rica. Whenever it is in season, which is most of the year, the bunches of fruit may be seen in the markets. On almost every corner of the main streets of the towns, cart vendors may be seen selling the individual fruits.

The fruit, about the size of a large plum or small peach, has sometimes been called the "peach palm." It contains a single seed, and at maturity is either yellow or orange-red. It is not palatable when eaten raw; in fact, it may have decidedly unpleasant results. Therefore it is boiled for several hours, often with meat, which enhances the flavor, and eaten cool.

It is difficult to find precise words with which to



The trunks of the palm are covered with long, stiff spines, which were, in the past, used as needles by the Indians.



Young peji-baye palms growing on the grounds of the Inter-American Institute of Agricultural Sciences at Turrialba, Costa Rica. A wide variety of tropical crops are being studied and improved at the Institute.

describe the taste of this palm fruit, but the general consensus of North Americans who have eaten it is that it most nearly resembles chestnuts, with perhaps a little good cheese mixed in. Some people use it as a salad or vegetable, with either a little melted butter or mayonnaise. Some use it as a stuffing for fowl, and others finish the meal with it. By the majority it is enjoyed as a between-meals snack, much as North Americans would eat peanuts or popcorn. One does not have to go far in Costa Rica to see evidence of its popularity, for the leathery peelings and olive-like seeds are seen in many of the streets.

The edible part of the peji-baye fruit is formed by a starchy substance that abounds in its fibers. This contains a relatively high proportion of carotene and niacin, and is unsurpassed in food value among palatable tropical fruits. The orange-red fruits have a higher nutritional value than the yellow. However, most Costa Ricans prefer the yellow ones because of their better taste, which is probably due to less oil and fewer fibers. This palm product, both because of its flavor and its food value, certainly deserves a wider use, as was pointed out, as long ago as 1921, by Wilson Popenoe and Otón Jiménez.

The tree itself is rather impressive, sometimes reaching a height of sixty feet. Perhaps its most notable characteristics are the circular rows of forbidding-looking, long, sharp spines that adorn the trunk. Climbing the tree is virtually impossible, except for those rare trees that lack spines, so the harvesting is done by means of long bamboo poles with knives attached to the end, or by ladders. The dark-green, feathery leaves and the orange flowers, followed by the bright-colored fruits, make it an attractive



Bunches of the fruits of the palm are sold in all of the principal markets throughout Costa Rica.

tree at any season of the year. So it is also prized as an ornament.

The tree is not cultivated in orchards in the usual sense, but grows in small groups, or singly in back yards. This palm is unknown in the wild state, and its presence away from settlements is an indication that people have lived there in the past. It is primarily a tree of the lowlands and does not grow well above altitudes of 3000 feet. In all probability it is not native to Costa Rica, but was introduced in prehistoric times. According to Seibert it is a native of South America.

The use of the pejabaye as a food plant is ancient and perhaps antedates corn. Like corn, it was the staff of life for many groups of Indians, who made chicha, an alcoholic beverage, and tortillas from it. According to Popenoe and Jimenez, the Jibara Indians of Ecuador held a special festival to celebrate the ripening of its fruit. The plant is still useful in many other ways. The wood is extremely hard and was used



Vendors of the palm fruits, cooked and ready to eat, are a common sight in San José.

to make bows, spear shafts, and arrow points. The spines of the trunks were used for needles, and the bark is still popular among the poorer classes in making the bottoms of beds—with the spines removed, needless to say. The leaves, as with most palms, were formerly used to thatch roofs.

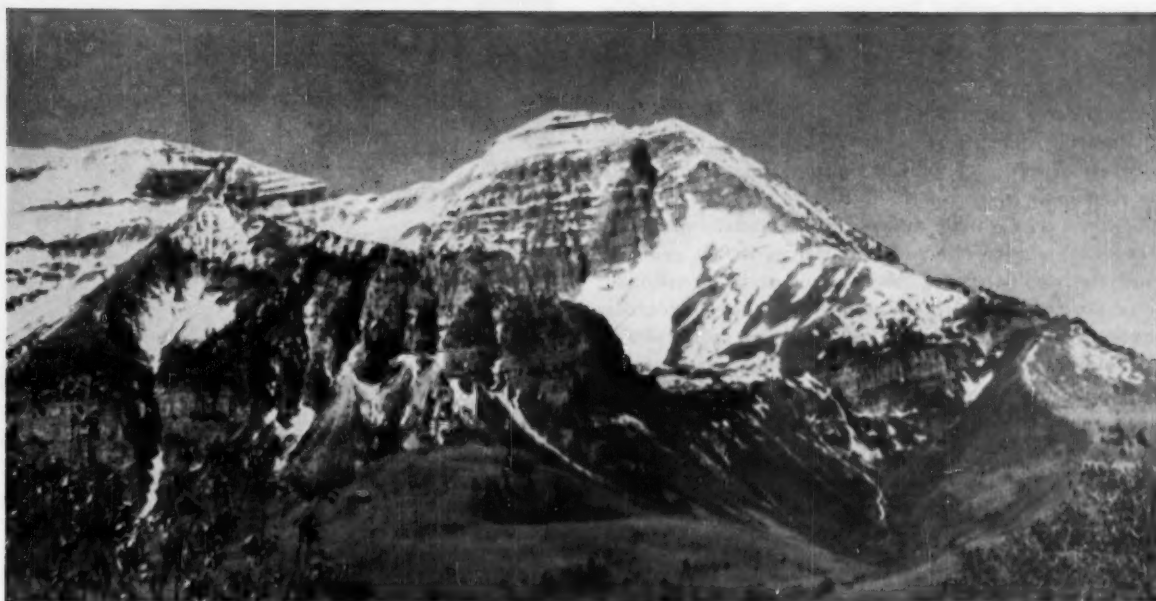
In some countries the young plants are used for the palm-hearts, or "cabbage," a food delicacy that is now canned and becoming known in the United States. This practice is rare or unknown in Costa Rica, because to obtain the palmheart the plant must be killed. During the conquest of Costa Rica the Spanish brought in some Nicaraguan Indians as helpers. The Nicaraguans started culturing the pejabayes and eating "the cabbage," as they had probably done with the palms in their homeland. This resulted in an uprising among the native Indians. The Costa Ricans to this day prefer to allow the pejabaye to mature and to harvest the fruits, obtaining their palm-hearts from other species.

Bird Towns

By HARRY W. GITHENS

BIRD lovers might be specially content to dwell in any one of more than half a hundred communities in the United States, places that have received their names from more than a score of the feathered tribe. These include: ROBIN—Idaho; LARK—North Dakota, Texas; CANARY—Oregon; ORIOLE—Indiana, Maryland; WREN—Georgia, Oregon, Virginia; BLUE JAY—California, West Virginia; JAY—Maine, New York; SPARROW—Kentucky; RAVEN—Kentucky, Virginia; SWALLOWS—Cal-

ifornia; PARROT—Georgia, Kentucky; EAGLE—Colorado, Michigan, Maine, Texas, West Virginia, Wisconsin; PIGEON—Kentucky, Michigan, Pennsylvania, West Virginia; RED BIRD—Missouri, Nebraska, Oklahoma; CRANE—Missouri, Montana, Texas; DUCK—North Carolina, West Virginia; HAWK—North Carolina, Ohio; CROW—Oregon, Texas, West Virginia; CUCKOO—Virginia; HERON—Michigan, Montana; PELICAN—Louisiana; SWAN—Iowa, Missouri; FALCON—Mississippi.



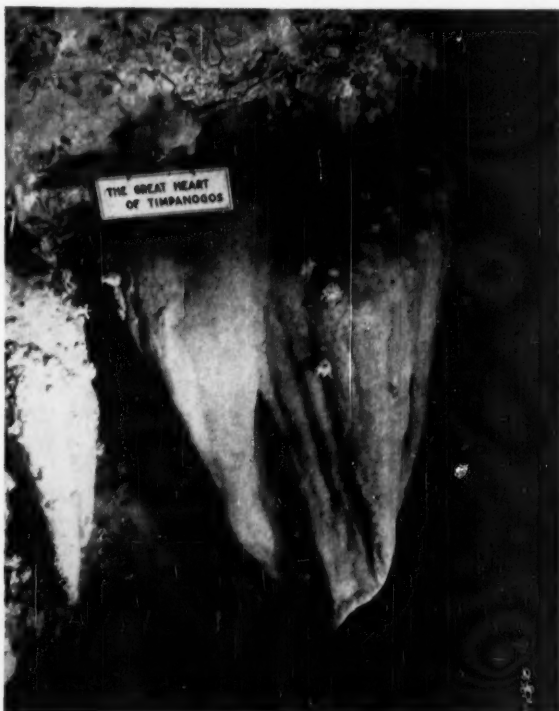
High on the steep north face of Mt. Timpanogos, shown here, is Timpanogos National Monument.

Nature's Jewel Box

By NELL MURBARGER

Photographs by the Author

Perhaps the most famous formation in the cave is the one resembling the human heart. It is lighted with indirect red light.



FOR MARCH, 1955

HIGH on the sheer north face of Mt. Timpanogos, twenty-five miles south of Salt Lake City, are situated Utah's three most beautiful known caverns. These constitute a jeweled trio, connected by man-made tunnels and permanently preserved as Timpanogos Cave National Monument.

First of these caves to gain man's attention was discovered, nearly seventy-five years ago, by Martin Hansen, a railroad tie cutter. Fame of the grotto spread rapidly, and throngs of curious began flocking to the spot. Conservation, unfortunately, was practiced little at that time, so it was not long until the cave's winding passages had been largely stripped of their delicate formations, some being stolen, others sold as souvenirs.

About forty years after Hansen's discovery, the cavern now known as Timpanogos is believed to have been found by the young son of a mining prospector, who assertedly fell into the limestone pocket while playing on the mountainside. The boy's family, for some reason, exercised great care in sealing the opening and made every effort to keep the discovery secret.

Rumors of the find and its approximate location eventually leaked out, and in 1921 a party of hikers from Lehi, Utah, one day set forth in search of the cave. Credit for its rediscovery belongs to Vearl J. Manwill, a member of that party.

Fearing that these incomparably beautiful formations might suffer the same sad fate as those in Hansen's cave, the discoverers immediately formed a supervisory committee and took steps to assure preservation of the natural wonder. To this end, both Timpanogos cave and Hansen cave, half a mile to the west, were set aside by President Harding, in 1922, as Timpanogos Cave National Monument.

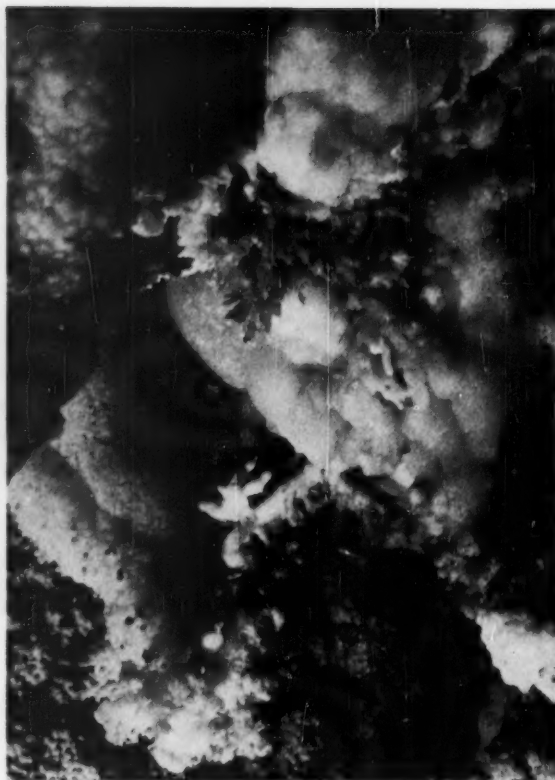
That same year saw discovery of Middle Cave, a narrow, winding channel situated between the two

**Some of the varied formations found in Utah's
Timpanogos Cave National Monument.**

earlier-found caverns. First entered from the top by means of ropes, this cave was found to be the deepest of the three, with a vaulted ceiling occasionally reaching a height of 125 feet.

During 1922, their first year of official operation, the caves were visited by more than 10,000 persons, and the popularity of the monument has continued unabated throughout the more than three decades since. Thousands of dollars have been spent in developing the caves and a steep, mile-long access trail. An eighty-five-foot man-made tunnel now connects Hansen and Middle caves, and a tunnel twice that long links Middle and Timpanogos caves, thus providing one continuous passageway, about half a mile in length. Indirect lighting has been installed throughout.

Sixteen different types of formations have been cataloged in the caves, these ranging in color from snowy white to pastel tints of ivory, yellow, coral, russet and mauve. In addition to the downward-flowing stalactites and upward-mounting stalagmites, common to all scenic limestone caverns, visitors to the Timpanogos caves find special interest in an unusual type of formation known as "helictite." Seldom larger around than a lead pencil, these little stone fingers are curled and twisted in every conceivable fashion, some forming even complete circles.



Several fairy pools of water add to general loveliness of the picturesque scenes found in these splendid caves

★

Late Winter up North

By EDITH UNNERSTAD

Long and longer still, white butterflies were falling
Making a nest of wings for a world of gnarly stone.
Rocks turned to silent hills, soft humps of moonwhite snow-down.
Now comes at last a day when the air is tinkling and thin.
All of a sudden the sky is blue like the shell of a bird's-egg.
Ice lupines on the panes slowly slide down and melt
And on his way back home from the village shop with his burden
Smiling, crook-kneed Lapp comes lazily skiing by.
Burning gold is his wrinkled mustard face in the sunshine.
Blue is his blouse and scarlet the tassel on top of his cap
And at the back of his bursting wallet swinging
Hangs in a string a rosy parcel of knäcke-bread.
Winter-tired cows are drowsing still in the byre
Lying on dung and litter halfway up to the roof
Chewing the mountain hay, with pallid tongues greedily licking
Yellow sunstreak that creeps over crystal frost on the wall.
Unbelieving, they lift their hornless heads to the loop-light
Watching a dizzy Christmas-fly begin its summer song.

Sprague's Pipit and Others

By H. H. PITTMAN

Photographs by the Author



Meadow pipit.

THE PIPITS are a group of small, brown birds about the size of house-sparrows, but with fine bills, slender bodies and the long-hind-clawed feet of larks. They are ground birds generally difficult to see on the prairie, except during flight, because the character of the places they frequent makes concealment easy, and they are inclined to crouch and hide. Two species occur in Canada, but one, the American pipit, lives in the north and appears only on the plains during migration. A summer resident

is the slightly larger Sprague's pipit, *Anthus spraguei*, which I have found rather sparingly in the parts of Manitoba and Saskatchewan I know best.

This is a bird of the wide open prairie, and this pipit seems to retire before the ever-advancing front of civilization, possibly because of the destruction of suitable nesting-grounds by cultivation and grazing. I once found a nest in the "park belt" of Saskatchewan, an area where little thickets of poplars and willows surround the depressions that hold snow-water in the spring. These thickets may be far apart, but there are many places where they are numerous enough to give the impression that the horizon is a ring of trees. A better idea of this part of the prairie may be had from the air, from which vantage the thickets look like dark green oases against the brown grassy plains. With this exception I have found pipits only in the broad fine-grass districts—the "transition zone" of ornithologists—where occasional straggling groups of stunted wolf willows are all that serve to relieve the bare monotony of rolling prairie, which seems to reach from an observer's feet to the horizon—inspiring or overwhelming, according to your mood.

Sprague's pipit has been described as "earthy-brown," but the pale borders of the

feathers of the back plumage seem to me to give them more of a sandy or cold brown appearance, with little definite pattern except upon the ochre breast, which is streaked with dark brown. This is ideal plumage for concealment among tussocks of dry grass. The white outer tail-feathers are conspicuous momentarily as the bird rises, and more so if the observer is in a favorable position to watch the pipit in the air with field-glasses. A pipit on the ground, and again field-glasses as well as luck are needed, reminds one of both the wagtails and the larks. The general coloration and the long hind-claw, combined with the habit of walking instead of hopping, are lark-like. The occasional jumps to catch passing insects, and the movements of the tail, resemble habits of the wagtails, although a pipit's tail is shorter.

The song of Sprague's pipit immediately reminds the listener of that of the European skylark, not so much in quality or volume as from the way it is delivered as the bird swings in circles high overhead. I find comparison difficult, because I have heard only single pipits singing, and there are often many skylarks in the air at once, but the bare broad surroundings, bathed in sunshine and with the songs coming from above, have a certain pleasant similarity. The song is



A Sprague's pipit on the nest, which is built of fine, dead grass and so beautifully hidden that it is found by accident.



The nest of the meadow pipit, a European species found widely in open country in Great Britain.

simple but sweet, and is repeated, again and again, for ten minutes or more, with hardly a pause, before the bird descends abruptly to the ground. The song in such surroundings is distinctive and an excellent help in identification.

The few nests I have seen were always among the finest prairie grasses, and rested on the ground. They were built of fine dead grass, and were so beautifully hidden that their discovery was invariably by accident. These pipits seem to sit closely, especially when incubation is far advanced, at which time they will even permit a little rearrangement of the surroundings without showing undue alarm. Like the larks, they generally alight some distance from the nest and approach it on foot, even when bringing food to their young ones. The four or five eggs are grayish-white, thickly speckled with gray and brown, and closely resemble those of some races of horned larks. Sometimes they have fine hair-lines on the larger end. As the eggs of some of the other pipits also usually have fine lines, this may be a family characteristic.

In Europe pipits are abundant. Three species regularly breed in England, and several others have been recorded more or less frequently. The commonest is the meadow pipit, *Anthus pratensis*, found almost everywhere in open country and really numerous on the South Downs. The lark-like, straight hind-claw is longer than the hind-toe, and I have not seen the bird settle on anything higher than one of the little gorse-bushes found in the hollows. It also sings on the wing, but usually ascends only to a height of thirty or forty feet, and the song is of poor quality.

Another familiar species is the tree pipit, *Anthus trivialis*, a slightly larger and usually rather darker bird that frequents open spaces between woods and thickets. The hind-claws are not quite as long as the



The tree pipit is European, also, a larger and rather darker bird found between woods and thickets.

hind-toes and are curved, for this is one of the few pipits that perches in trees. It has a pleasing song, delivered in the air, as the bird rises almost perpendicularly from a branch and then descends slowly, with widespread wings and tail, to the original starting place.

Comparatively little attention has been given to the intelligence of small birds, and we are only now realizing that it varies both with species and individuals. That there may be clever birds and stupid ones in the same nest has been proved by the patient observations of Miss L. Howard in Sussex, but a field-naturalist soon learns this applies to species also. Some species are more likely to adjust themselves to changed conditions, or to react to an emergency in what seems to us a wiser manner. My own experience with a tree pipit many years ago is interesting, and, although it proves nothing, has left me with the impression that the intelligence of this group may be above the average.

I once brought a pipit's egg from a distant nest in what seemed a dangerous place and put it in the nest of another small insectivorous bird close at hand, hoping to get a series of pictures later on. When the young bird was ready to fly I placed it in a cage and fed it by hand until it could look after itself. It quickly became so tame that the cage was only used at night, and the bird was allowed the freedom of the house and garden during the day. What impresses me now, as I look back, is that this pipit learned to know me and could recognize my voice. During afternoon tea in the garden, it would apparently look for crumbs on the ground until I put my foot out as an invitation for it to run up my leg. From my knee it would cross over to an arm and so get on the table to search for fruit-cake crumbs. I have sometimes wondered if the brothers and sisters of this pipit would have acted in the same way, or whether this bird was exceptional.

Feathered Tree Cleaners

By E. LAURENCE PALMER

Illustrated by L. A. Furler, Edwin A. Sawyer, Hope Sawyer, Clara Garrell, and Carolyn Powers

*This is the eightieth in NATURE
MAGAZINE's series of educational
inserts.*

WE have had inserts dealing with birds of the sea, birds of our shores, of our farmyard, with game birds, with birds of prey, and with birds of particular groups, like the sparrows, warblers and so on. This time, while we stick to birds, we are trying to get you interested and acquainted with birds that have certain habits in common; 'species that glean their living from the bark and twigs of woody plants.

In earlier inserts we neglected to mention woodpeckers as common, everyday birds. We were saving the woodpeckers for this number. While the American Ornithologist's Union "Checklist" of birds lists 10 North American genera, 22 species and 64 subspecies of woodpeckers, we prefer not to limit ourselves to woodpeckers but to introduce some other birds that behave or function according to the accepted woodpecker patterns. Accordingly, you have help here on two titmice, two nuthatches, a creeper and a warbler. It is probable that few of you will see and recognize more than a dozen woodpeckers anyway, unless you travel widely and observe extensively.

The study of any group of organisms involved in performing a common function leads to some interesting observations, and in this our feathered tree cleaners are no exception. We cannot honestly claim that we believe that wherever a need exists in Nature it is sure to be met. Even granting that this might be the case, we find ourselves challenged by the facts that there are apparent needs for control of organisms affecting adversely our woody plants, and there are birds that seem admirably suited to do the job of meeting these needs. Ecologists speak of niches, or the status or place an organism occupies in its environment. In this sense we are writing here about a particular niche association, mainly with the surfaces of woody plants.

Before we discuss this point further, let me suggest that you go *outdoors* and look closely at the bark and twigs of the most convenient woody plant available. Then come back



RED-BELLIED
WOODPECKER



WHITE-HEADED
WOODPECKER



GILA WOODPECKER

and let us talk over what you have noticed.

I am reasonably sure that you found that the outside of the woody plant was covered with bark. It may have been close-fitting, as on a beech tree; roughly furrowed, as on an elm; peeling off in loose fragments, as on a hickory, sycamore or birch. If you looked closely at this bark you would recognize that it seemed to provide excellent hiding places for many small creatures that, under the loose bark, could find protection from their enemies, the heat of the sun, the beating of the rain, or even a covering of ice. Many of the creatures that find shelter in the outer covering of our woody plants also find food there. Some eat the loose outer bark. Others make their way inward to the fresh-growing tissue beneath the bark. Still others burrow into the heartwood and there find themselves relatively free from enemies, and completely surrounded by food. Small wonder, under these circumstances, that these creatures make the most of their opportunities. Small wonder, also, that, unless some control enters the picture, their appetites may lead them to eat themselves out of food and lodging.

One cannot remove the bark from a living tree and expect it to live. Neither can one kill the bark on the tree and expect the tree to prosper. Many insects either remove or kill the bark of trees.

Here are a few of the things you might well find on the bark and twigs of woody plants. The twigs may bear egg masses of common cankerworms, tent caterpillars, or aphids and other harmful insects. If left undisturbed, these eggs may hatch into caterpillars that will feed on the leaves and possibly destroy the food manufacturing part of our tree. In the coarser bark will be found the crawling, wingless, female cankerworms that emerge from the ground and climb to the tree tops to lay their eggs. On the way up they may mate with the winged males or they may be eaten by some hungry bird. It is important to the tree which of these events takes place. Also, in the bark, may be hid-



**PILEATED
WOODPECKER**



**RED-COCKADED
WOODPECKER**



FLICKER

den the cocoons of tussock moths, or tent caterpillars and the like. These may be destroyed by the marauding bird. Beetles of many kinds, aphids, bugs and other small animals may occur in swarms over the bark of our tree. Some, like the snowy tree crickets and the ladybird beetles, may be useful as destroyers of other insects, but even some of our ladybird beetles are destructive of some plants. Spiders and mites may be found hiding under the loose bark of trees, and some of these help the trees, while others harm them. In other words, I am trying to point out to you that in and on

the loose bark of twigs and trunks of woody plants is a little world in itself.

If you tear off the loose bark on a dead tree you may find that just beneath it remain the burrows made by many insects. Engraver beetles and other wood-boring larvae, about which we told you in an earlier insert on beetles, seem to enjoy girdling and killing our trees. Of course we know that they do not do this deliberately, but live according to the pattern established by their ancestors. You may never see the creatures that ruin the inner bark of trees but usually you can see their work without much difficulty.

Should you break open an old dead stump, or split the wood in an old tree trunk, you frequently will find that our wood-boring insects have made their way into the innermost recesses of the tree. You may be fortunate and find the cause of these injuries, but the chances are that you will see only a few burrows and recognize that the tree has been killed.

Thus we have a job to do if our woody plants are to be protected. The twigs must be wiped free of the eggs of insects that may eat the leaves. The bark must be



**ARCTIC THREE-TOED
WOODPECKER**

cleaned of insects that destroy it. The inner bark must be cared for by the destruction of the insects that bore in that area, and the inner wood must also be cared for in some way. It should be obvious that the same creature that can be effective in removing insect eggs from a twig could do little to destroy an insect buried inches deep in wood. Fortunately it is not necessary that any one of these creatures do every kind of work that needs to be done.

In our illustrations, and in the chart section of this unit, we have tried to help

you understand more about some of the birds that do these different jobs in their own particular ways.

The task of clearing the twigs of insect eggs calls for small, active birds that are satisfied with food of small volume. They must be so light in weight that they do not injure the twigs on which they work. To meet this situation we call your attention particularly to the chickadees and tufted titmice. Already, in an earlier insert, we introduced many of the warblers that are past masters in giving help of this sort, and pointed out that the time of year when they are likely to be present in greatest abundance frequently is the very period when their assistance is most needed.

The bark surface of the coarser parts of our trees calls for birds that can crawl about freely on the upper and under side of limbs, and up or down on the trunk. Ideal for this sort of activity are the black and white warblers, the nuthatches, the chickadees and the downy woodpeckers. Ants, particularly of the wood-boring type, are frequently the most serious enemies of woody plants, and so it is fortunate that we have birds like the flickers, which seem to have an insatiable appetite for ants. To



**CALIFORNIA
WOODPECKER**



**BLACK-CAPPED
CHICKADEE**



**YELLOW-BELLIED
SAPSUCKER**



**HAIRY
WOODPECKER**



**BLACK AND WHITE
WARBLER**



**RED-BREASTED
NUTHATCH**

get these they haunt the openings made by an ant colony, either on the tree or on the ground, and the job they do should be genuinely appreciated.

When it comes to tackling the elimination of the insects that bore deeply into the trees we must look for a creature powerful enough to get to where the enemy may be. Downy woodpeckers may burrow in a bit. Flickers are powerful enough to dig in still farther, but when a real job is needed the pileated woodpecker comes into the picture. Fortunately pileated woodpeckers seem to be on the increase. Unfortunately their larger relatives, the ivory-billed woodpeckers, are becoming or are now actually extinct.

One could wax poetic about the ways in which most of these birds are fitted to do the job they do. Their appetites usually demand that they eat what we want destroyed, although this is not always the case. Their feet are suited for clinging to the bark or twigs of our trees. In many cases their tails are stiff-feathered and provide a staunch support for a bird that has vigorous work to do. Added to this are bills as well suited to the doing of particular jobs as are the fixtures on the best vacuum cleaner. There are the fine curved bills of the creepers, suited to probing under loose bark; small pointed bills of the chickadees suited to picking fine

insect eggs from small twigs; reasonably stout bills on the smaller woodpeckers suited for probing the loose outer bark, and even chisel-like bills of some woodpeckers that seem to be used to pry loose pieces of bark apart rather than to drill holes. Most spectacular of all are the substantial bills of the larger woodpeckers that make it possible for them to dig great holes in reasonably solid wood and remove the insects damaging the interior of our trees.

Not only are the feathers, feet and beaks of our tree gleaners suited to these particular jobs, but in many cases the birds have long tongues, sometimes with spike-bearing tips that may be thrust deep into small holes and capture the insects that are needed for food. Sometimes these tongues are particularly sticky and therefore are exceptionally efficient in bringing to the surface insects that might well do great harm.

I hope that you will note that I have avoided saying that the woodpeckers and other birds are particularly adapted to do the jobs they do. To me adaptation infers an intelligent, possibly studied, modification to meet a need. I doubt if any of these birds, even over long periods of years, made any intelligent effort to change their structures to meet a particular need, or that they chose mates that they felt sure would provide them with young that could do better jobs than did the old folks. They developed these queer structures and used them, to be sure, but I doubt if there was ever the slightest bit of adaptation in the process. Once they had the structures it was only natural that their habits changed to meet the limitations provided by their morphology. No one can deny that the structures are suited to do particular jobs. I, at least, can object to saying that the birds adapted themselves to meet these needs.

But why worry about semantics when we still have not exhausted the interesting possibilities presented by our subject? The food problem, so far as these birds are concerned, is not adequately covered by the preceding paragraphs. If a redheaded woodpecker had adapted itself to boring into wood for its food, why should it, to its detriment, spend so much time trying to catch flying insects on the wing? If a flicker adapted

(Continued on page 144)



**RED-HEADED
WOODPECKER**



**BROWN
CREEPER**



**TUFTED
TITMOUSE**

COMMON NAME SCIENTIFIC NAME	FLICKER <i>Colaptes auratus</i>	PILEATED WOODPECKER <i>Dryocopus pileatus</i>	RED-BELLIED WOODPECKER <i>Centurus carolinus</i>	GILA WOODPECKER <i>Centurus uropygialis</i>
DESCRIPTION	Length, to 13 inches. Wingspread, to 21-1/3 inches. Tail, to 4-4/5 inches. Bill, to 1-2/3 inches. Weight, to 6 ounces. In flight shows conspicuous white rump. Yellow under wings. Tail, black-tipped. Body, barred and streaked with black and brown. Males and sub-adult females show black "moustache."	Length, to 19 inches. Wingspread, to 30 inches. Bill, 1-4/5 inches. Tail, 6-1/5 inches. Weight, to 1 pound. Female, the smaller. Dark brown to black, flashing white in flight. Crest, conspicuously red. Forehead and fore crown of female, gray brown and line along bill black rather than red.	Length, to 10-3/5 inches. Tail, to 3.4 inches. Bill, to 1.1 inches. Back, conspicuously crossed by narrow dark bands, "zebra-backed." Crown of male, red. Nape of female, red. Cheeks, throat-sides, underparts, white. May be faintly reddish about middle of breast and abdomen and bill base. Rump, white. Young, without red.	Length, 8-10 inches. Tail about 3 inches. Bill, about 1 inch. Midway in size between robin and towhee. Back, rump and wing coverts, black-and white-banded. Belly, pale yellow. Head, neck and underparts, drab. Adult male, with red crown and pale yellow belly, but adult female, with paler belly and without red crown.
RELATIONSHIP AND RANGE	Order Piciformes. Family Picidae. Two subspecies, the Northern and the Southern. Breeds from tree limit in Alaska south to Nevada and east through northern and central United States. Winters south to Gulf Coast and southern Texas. Subspecies, 4, extend range to Alaska and Lower California, east to Missouri.	Order Piciformes. Family Picidae. Three species in the genus and 2 subspecies, Northern and Southern in the species. Northern resident from central Mackenzie to New Brunswick and Nova Scotia and south to Minnesota, Pennsylvania and farther in Alleghenies. Southern, south to Gulf Coast and Texas.	Order Piciformes. Family Picidae. Five American species in the genus include the Gila Woodpecker, the Cardon, the Brewster's and the Golden-fronted. This species ranges through eastern and southeastern United States from southeastern South Dakota through southwestern Ontario to western New York and western New England, and south to Florida and Texas.	Order Piciformes. Family Picidae. South-eastern California along Colorado River, in extreme southeastern Nevada through southern Arizona to southwestern New Mexico favoring low desert areas, extends range south into Lower California and Jalisco.
REPRODUCTION	Nests in a hole in a dead tree, telephone pole or nesting box. Hole, to 3 inches wide, to 2 feet deep and to 60 feet up. Violent courtship. Eggs, 3-20, white, with high gloss, 1/4 ounces, 1-1/6 by 7/8 inch. Incubation, by both sexes, 11 to 16 days, with 1-2 broods a year. Male recognizes female by sight.	Nests in hole in large tree 12 to 60 feet up; a cavity to 30 inches deep, with 3-4 inch entrance, chip-lined. Eggs, 3-6, glossy, white, 1 1/4 by 1 inch. Incubation, by both sexes, 18 days, mostly in May. Young, naked when hatched but develop plumage in nest. Adults molt late summer, not in spring.	Nests in hole in tree or pole, from 15-50 feet above ground, with 1 3/4 inch entrance and 1 foot depth, in May and June. Eggs, 3-5 or more, 1 by 2/3 inches, dull white. Incubation by both parents, for two weeks. Young, helpless when hatched, resemble female the first winter although precocious males may develop red on head.	Makes nest hole in giant cactus. Flowing cactus juice may make hole unusable for a year. Or may build nest hole in cottonwoods, mesquites, willows, sycamores or oaks. Eggs, white, 3 to 5, scarcely glossy, laid in April or May, usually one brood, with both parents helping rear the young.
ECOLOGY	Food largely insects, particularly ants, often collected on ground. One stomach contained 5000 ants. Other insects include crickets, grasshoppers and beetles. Insects about 61% of total food, remainder being wild fruits, cherries and weed seeds. Young molt to adult plumage June to October. Speed, 44 m.p.h.	Flight like that of a swooping crow, with repeated undulations. Digs huge rectangular holes, seeking carpenter ants that make up major portion of food. May also eat caterpillars and cockroaches, or rarely berries and cherries. Calls a loudly repeated kuk-kuk, like a loud flicker rising at beginning.	Found in a variety of places where trees grow, either in forests, woodlands, along streets, or where a few isolated stands are to be found. Food, chiefly insects such as beetles, caterpillars, bugs and their larvae. May on occasion eat corn or the sap of trees. Calls a repeated chad, chad or a wicker when mating.	Field characteristics include white wing patches, showing in flight, with back "zebra-striped" and male with red crown. Food may include eggs of other birds. Late season nest may be for general occupancy rather than for rearing family. Old nests may be used by other birds.
ECONOMY	Highly useful as destroyer of insects particularly ants that may encourage crop-destroying aphids. Also destroys European corn-borers, which threaten economy of Corn Belt. Known as high-hole, high holer, yellow-hammer, golden-shafted woodpecker, and, the western form, as red-shafted woodpecker. Males may fight vigorously at mating time.	Undoubtedly useful as a destroyer of wood-destroying ants. Not known to injure common orchard trees. Abandoned nests are used by wood ducks, squirrels and other wildlife unable to duplicate the effort of excavating. The very spirit of the wilderness, but becoming adjusted to living relatively near man.	May injure some fruit trees, such as oranges, in the southern portion of the range, but ordinarily may be considered a highly useful destroyer of injurious insects. May wander north of usual range after the summer breeding season. Erratically migratory.	Flight call a repeated huii and ordinary call a coarse tcheurr, repeated. May feed on insects of the desert area occupied, but also may be considered as an enemy of birds on whose eggs they may feed. Particularly interesting because of inquisitive nature that seems tireless.

RED-HEADED WOODPECKER <i>Melanerpes erythrocephalus</i>	CALIFORNIA WOODPECKER <i>Balanosphyra formicivora</i>	YELLOW-BELLIED SAPSUCKER <i>Sphyrapicus varius</i>	HAIRY WOODPECKER <i>Dendrocopos villosus</i>	DOWNY WOODPECKER <i>Dendrocopos pubescens</i>
Length, to 9½ inches. Wingspread, to 18 inches. Bill, to 1½ inches. Tail, to 3¾ inches. Female, generally smaller than male. Head and neck of adults, red. In flight, appears to be a red-headed black and white woodpecker with large, square, white wing patches. Head of young, gray. Weight, 2-4/5 ounces. Temperature, 107.2°F.	Length, to 10 inches. Tail, 3 inches. Bill, 1.14 inch. In general, the size of a robin. Female, slightly the smaller. Upper parts, glossy green-black. Rump, upper tail-coverts, white with large, white wing patches showing in flight. Throat, yellow. Lower breast, white with black streaks. Crown, red but restricted forward in female.	Length, to 8-4/5 inches. Wingspread, to 16 inches. Tail, to 3-1/3 inches. Crown and throat of male, a deep scarlet. Throat of female, white. Back, heavily barred with black and yellow-white. Breast, black. Sides, streaked with black. Belly, pale yellow. Crown is sometimes black in female. Young, much like female.	Length, to 10½ inches. Wingspread, to 17½ inches. Tail, to 4 inches. Bill, to 1-1/3 inches. Weight, to 3 ounces. Male, with scarlet nape. Black above but middle of back white. Mostly barred black and white. Middle tail feathers, black. Outer tail feathers, white. Temperature, 105°F.	Length, to 7-1/6 inches. Wingspread, to 12 inches. Bill, to 4/5 inch. Weight, to 1½ ounce. Black and whitestreaked in general. White outer tail feathers, obscurely barred or spotted with black. Male, with red nape. Southern subspecies is browner beneath. Temperature 108°F.
Order Piciformes. Family Picidae. But one species in the genus and no subspecies. Ranges from southeastern British Columbia, central Alberta, Manitoba and southeastern Ontario to central Montana and central Wyoming and Colorado to New Mexico, Texas, the Gulf Coast and southern Florida. Becoming reduced.	Order Piciformes. Family Picidae. From Oregon to southern California in the Pacific coast ranges in Upper Austral and lower Transition zone areas. A.O.U. checklist gives five subspecies, including the Mearns's, the San Pedro, the Narrow-fronted Woodpecker and the Ant-eating Woodpecker, extending range to Texas and Lower California.	Order Piciformes. Family Picidae. Breeds from central Mackenzie through central Manitoba and southern Quebec to Cape Breton Island and south to Missouri and North Carolina in the mountains. Winters from Iowa to Massachusetts and south to Jamaica, western Mexico and western Panama.	Order Piciformes. Family Picidae. Seven American species in the genus and 13 subspecies in the species. Northern form ranges from Alaska to eastern Quebec and south to central Ontario and North Dakota to British Columbia, with other subspecies extending range through United States south to Florida and California.	Order Piciformes. Family Picidae. Largely resident. Ranges from Canadian and Transition zones in eastern and central North America from southeastern Alberta to Ungava and south to Nebraska and Virginia. Six subspecies recognized that extend range to California, Alaska and Florida. Rarely above 3,000 ft. altitude.
Nests in a hole with a 1½-inch entrance and 18-inch depth, in a tree or pole, chip-lined. Slightly glossy eggs, 4-6, 1-1/6 by 9/10 inches, white. Incubation two weeks, by both parents. Two or one broods a year. Young lose brown on head after first fall or winter. Complete fall and partial spring molts.	Nests usually in a hole, 6-18 feet above ground, usually in white oaks, but may be in pines, cottonwoods, black oaks and other trees. Eggs, 4-6, white, with little gloss, 1 by 4/5 inch. Incubation, 14 days, by both parents. Sometimes two pairs share a nest. Young blind when hatched. Juvenile feathers molt second fall.	Nests in holes in trees, in mixed or coniferous forests, or even in trees in marshes or mixed farmlands. Hole, with 1-3/5 inch entrance, to 18 inches deep and 12-40 feet above ground. Eggs, white, 5-7, slightly glossy, 9/10 by 2/3 inches. Incubation, for 2 weeks by both sexes. One brood a year. Both parents help.	Nests in hole in a tree, in a woodland or orchard tree trunk or branch. Entrance, 2 inches; depth, to 16 inches. Up to 5-50 from ground. Eggs, 3-5, shining white, 1 by ¾ inches. Incubated 2 weeks by both parents. One brood a year. Young, soon resembling adults.	Nests in a hole in a post, tree trunk or branch in orchards, mixed forest or shade tree. Entrance, 1½ inches, depth to 10 inches. Nests in May or thereabouts but may use nesting hole for shelter in winter. Eggs, 4-8, white, ¾ by 2/3 inches. Incubation, 12 days, by both parents. One brood a year.
Food, about 1/3 animal matter including grasshoppers, May beetles, ants, weevils, commonly caught in flight and sometimes stored. Rarely eats eggs of other birds. May eat corn, pears, apples, cherries, grapes and other soft fruits, and have been known to kill young chickens. Favors beech-nuts and acorns.	Food, chiefly acorns, but may eat fruit or sap. Stores acorns in holes drilled in outside of trees often covering considerable area. Up to 1500 found stored on one telephone pole. Acorns not broken when stored. Calls a repeated <i>jacob</i> , or <i>kerack</i> or <i>kerack-tchururup</i> . Definitely sociable and found in colonies.	Feeds on sap and inner bark of trees often killing trees by girdling them with closely placed borings. Drillings attract insects, squirrels, chipmunks, humming birds and other wildlife. May establish a circle of feeding spots that are visited regularly. Gives a definitely interrupted drumming.	Food, insects gleaned from bark and wood, or dug from dead branches. Particular enemy of hairy caterpillars and their pupae, including gypsy moths in their range. Also eats ants, grasshoppers, beetles and spiders. About 77% of food is animal matter, the remaining including nuts and seeds.	Food, 76% animal matter, mostly insects and spiders and most of which are pests of plants. Vegetable food includes sap and inner bark of trees and seeds of some plants. Individual range a few acres where food and shelter are available. Calls a repeated positive <i>peet</i> , <i>peet</i> or a rattling call.
Probably more useful than injurious and certainly is popular with beginning naturalists because of ease of identification, beauty and conspicuous nature. Habit of flying from telephone poles to capture insects on wing over high-speed highways may have reduced numbers tremendously and may become critical.	Probably of little economic importance but tremendously interesting in part because of food storage habits. Known to mutilate trees, to eat the eggs of other birds, and may make wholesale storage of useful acorns. Rumor that only injured acorns are stored is not well founded.	Fortunately is rarely abundant. May be definitely injurious to trees, particularly orchard and shade trees. Damage estimated at close to a quarter of a million dollars a year. Control not practiced because of small numbers. Interesting of course to ornithologists.	Unquestionably useful as destroyer of wood-destroying insects. Good orchard practice encourages the presence of these birds through the erection of suitable nesting houses. Individual range is but a few acres if food and shelter are available in sufficient abundance.	Highly useful as a destroyer of enemies of fruit and shade trees. It may on occasion injure woody plants by eating sap and inner bark, but this is more than offset by good done in destruction of insects. A welcome and common visitor to feeding stations and occupier of bird nesting boxes.

COMMON NAME SCIENTIFIC NAME	RED-COCKADED WOODPECKER <i>Dendrocopos borealis</i>	WHITE-HEADED WOODPECKER <i>Dendrocopos albolarvatus</i>	ARCTIC THREE-TOED WOODPECKER <i>Picoides arcticus</i>	BLACK-CAPPED CHICKADEE <i>Parus atricapillus</i>
DESCRIPTION	Length, to about 8½ inches. Crown, black. Back, black and white barred. Middle of tail, black. Outer tail feathers, black and white barred. Side of head and neck, white. Sides of body and under tail, white, with black spots and streaks. Underparts, pure white. Scarlet feathers on side of head behind eye. Female, without red on head but otherwise like male.	Length, to 9½ inches. Tail, 3-1/3 inches. Bill, 1-1/10 inches. Between robin and towhee in size. Head and neck, white with crown sometimes ashy. Male, with red on nape. White wing patches. Most body, legs and feet, rather uniform black. Female without red at nape. Young, like female essentially.	Length, to 10½ inches. Wingspread, to 16 inches. Yellow crown patch of male is lacking in female. Appears chiefly as a bird with a solid black back, with white on breast and narrow transverse black and white stripes on the sides. Bill, about ½ total head length. Two front toes and one hind, no fourth.	Length, to 5¾ inches. Wingspread, to 8½ inches. Tail, to 2-2/3 inches. Entire crown, throat and back of neck, black. No crest. Side of head and underparts, white. Back, gray. Outer margins of wing coverts, whitish in Black-capped Chickadee, but not white in Acadian Chickadee. Sexes, alike.
RELATIONSHIP AND RANGE	Order Piciformes. Family Picidae. In south Atlantic and Gulf States north to Virginia, Tennessee, Kentucky and Missouri and accidentally into New Jersey and southeastern Pennsylvania. Found primarily in open pine woods, and rather unusual in other types of woodland. May range west into Texas.	Order Piciformes. Family Picidae. Northern and Southern subspecies, with the northern the larger. Range from western Idaho, southern British Columbia and western Nevada in Transition Zone through southern California in San Gabriel, San Bernardino, San Jacinto, Santa Rosa and Cuyamaca ranges.	Order Piciformes. Family Picidae. Two species in the genus, with 3 subspecies of <i>P. tridactylus</i> . <i>P. arcticus</i> ranges from central Alaska through northern Mackenzie, northern Manitoba and northern Quebec to central California, Wyoming, Montana, northern Minnesota, Michigan, Ontario, New York and Maine.	Order Passeriformes. Family Paridae. Seven American species in the genus and 4 subspecies in the species. Subspecies include Black-capped, Oregon, Yukon and Long-tailed. Black-capped ranges from northern Ontario to Newfoundland and south to Indiana and North Carolina. Others range westward.
REPRODUCTION	Nests in living pine, in hole, 20-70 feet above ground. Nests in April and May. Nest may be used year after year. Hole may be dug to depth of one foot. Eggs, 3 to 5, glossy white, .9 by .68 inches. Family may stay together until late in the season and both parents assist in rearing the young.	Nests in June or thereabouts, with nest at rather low height, in hole in live or dead cone-bearer. Eggs, 3-7, pure white, .95 x .71 inches, often covered with pitch from the body of the incubating bird. Usually one brood, with both parents assisting in rearing young.	Nests in evergreen forests, in a hole to 2 inches in diameter, to 18 inches deep, widened at base and chip-lined. Eggs, 4-6, 1 by 4/5 inches, white with moderate gloss. Nests May and June. Incubation, 2 weeks by both sexes. One brood a year. Young, helpless when hatched. Noisy in breeding time.	Nest in trees, or nest boxes, or hollow stub, in a hole, with a 1-inch entrance and a depth of to 1 foot, 1-50 feet above ground. Eggs, 3-15, white, spotted and speckled with brown, 2/3 by 1/2 inch. Incubation, by both sexes 11-13 days. 1-2 broods a year, with both parents helping at all times.
ECOLOGY	Food is largely larvae of wood-boring beetles and interestingly enough of the larvae that bore into the ears of corn. May be found feeding in groups, most frequently in the higher parts of trees. May work its way down a trunk rather than up as do most woodpeckers.	Food, largely ants and spiders gleaned from the rough bark of cone-bearing trees for the most part. Bill used as a pry to loosen bark rather than as a device for digging a hole ordinarily. Call, somewhat like that of downy woodpecker, a repeated chick-ik.	Food, about 75% insects with balance of wild fruits, nuts and inner bark of trees. Seems to listen for movements of prey inside trees. Works almost exclusively on dead trees, often working for a long time and repeatedly on one tree. Drills hole for food.	Food, primarily insects and insect eggs gleaned from bark and twigs of trees or food gathered from feeding stations. About 68% animal matter including eggs of plant lice, weevils, bark beetles, flies, scale insects, ants, wasps and spiders. May defend a home territory 100 yds. across.
ECONOMY	Valuable as a destroyer of enemies of cone-bearing and other trees, and particularly of corn ears. Not shy. May be noisy, sounding like a downy woodpecker that is off key, or sounds a bit more rasping than the downy. Best field character is the white side of the head.	Undoubtedly useful as destroyer of insects that might be injurious to trees. Easily identified because of the contrasting white head and white wing patches with the otherwise apparently black body.	Useful check on wood-destroying insects, it being estimated that one bird may in a year destroy to 13,000 wood-destroying grubs. With the disappearance of dead timber from an area this bird may also be expected to disappear. Similarly, with the reduction of its food supply it vanishes.	Highly beneficial as destroyer of insects harmful to plants and a most enjoyable companion particularly for those who get their nature through a window. Is the State Bird of Maine. Song pitch, 3027-3700 c.p.s. Love song a high-pitched phoebe often confused with that of the phoebe.

TUFTED TITMOUSE <i>Parus bicolor</i>	WHITE-BREADED NUTHATCH <i>Sitta carolinensis</i>	RED-BREADED NUTHATCH <i>Sitta canadensis</i>	BROWN CREEPER <i>Certhia familiaris</i>	BLACK AND WHITE WARBLER <i>Mniotilta varia</i>
Length, to 6½ inches. Wingspread, to 10¾ inches. Tail, to 3-1/6 inches. Hen, smaller than the cock bird. High crest makes bird so conspicuous that it cannot be easily missed. Almost uniformly sooty gray with basal half of tail feathers whitish. Sexes colored alike and young resemble their parents.	Length, to 6-1/6 inches. Wingspread, to more than 11 inches. Tail, to 2¼ inches. Bill, to 1/3 inch. Female, smaller than male. Black capped. Back, blue gray. Breast, white. Female, duller on top of head than male usually. Young, only slightly different from adults. Brown on lower underparts.	Length, to 4¾ inches. Wingspread, to 8½ inches. Bill, to ½ inch. Tail, to 1-3/5 inch. Female, smaller than male. Much smaller than the common white-breasted nuthatch, with broad black eye-band and rusty beneath. Top of head of male, black with bluish gloss. In female, this area is gray to the rear. Young, like adults of same sex.	Length, to 5¾ inches. Wingspread, to 8 inches. Tail, to 3 inches. Bill, 11/16 inch. Inconspicuous, slender, brown-streaked bird, dark brown above and gray beneath. Tail feathers, stiff and used as a prop. Sexes, colored alike and young more light colored than the adults. Bill, slender and curved downward slightly.	Length, to 5½ inches. Wingspread, to 9 inches. Weight, to 1/3 ounce. Almost completely covered with longitudinal black and white stripes with heavier black areas on tail, wings and head and white areas at base of tail. Female, smaller than male. Acts like a nuthatch in many ways.
Order Passeriformes. Family Paridae. Ranges from Maine to Nebraska and south to central Texas and the Gulf Coast. Sometimes found in Wisconsin, Michigan, New York, Ontario and Connecticut but usually is further south. Resident in occupied area. Formerly a woodland bird, but now found in parks and on streets.	Order Passeriformes. Family Sittidae. Resident from southern Manitoba to central Quebec and south to northern Texas and South Carolina for the typical form. Seven subspecies extend range to Lower California, northern Mexico and Florida and northwest into British Columbia.	Order Passeriformes. Family Sittidae. No subspecies. Migratory. Breeds from upper Yukon area to Newfoundland and south to Massachusetts, Michigan, New Mexico and in mountains farther south. Winters from southern Canada to the Gulf Coast and southern California.	Order Passeriformes. Family Certhiidae. Five subspecies extending range over most of North America where there are trees and north of northern Mexico. Typical form breeds from central Manitoba to southern Quebec and south to eastern Nebraska and North Carolina. Winters over most of breeding range and south to Texas and Florida.	Order Passeriformes. Family Compothlyptidae. Breeds from central Mackenzie through northern Ontario to Newfoundland and south to Texas and Georgia and casually westward. Winters sometimes in border states to the south, but more commonly down to Venezuela, Colombia and Ecuador.
Nest, in a natural hole or woodpecker hole in a tree, post or stub. May nest in a bird box, usually 40-60 feet above ground. Eggs, 5-8, 2/3 by ½ inch, white to creamy brown, with brown or lavender spots. Incubation, chiefly by hen bird. In South, may be 2 broods a year; in North, one.	Nests in a hole or abandoned woodpecker's nest or in a bird house, 2-60 feet above ground, with fine lining. Eggs, 5-10, white or pink with brown or lavender spots at larger end, 5/6 by 5/8 inches. Incubation, 13 days by the hen. One brood a year. Nests in late spring or early summer.	Nests commonly in evergreen forest in a cavity in a dead branch or trunk, with 1-inch entrance, with pitch smeared around entrance, 5 to 70 feet above the ground. Eggs laid May and June, 4-8, 2/3 by 9/16 inches, white or cream, heavily blotched or dotted with brown. Incubation, 12 days by hen.	Nests usually in a swampy, wooded area. Nest usually hidden under a loose piece of bark on a tree, or in an old hole. Nest, of twigs, feathers, hair and cobwebs. Eggs, 5-9, white to gray, with some spots of reddish or purplish brown, 5/8 by ½ inch. Incubation, about 2 weeks, by female. 1-2 broods a year. Male helps.	Nest is commonly on ground in woodlands, at the foot of a tree or shrub. Nest, a mere depression in leaves. Eggs, 4-5, creamy white, abundantly spotted with brown, chestnut and lavender, ¾ by 7/12 inches. Weight, 1/25 ounce. Incubation, by female, 13 days. One brood a year.
Animal matter usually is about 2/3 the total of the food, and includes tent caterpillars and their eggs, saw-fly larvae, scale insects, tree hoppers, spiders and similar creatures. The plant food includes wild berries, acorns and nuts of many varieties and in winter plant food ranks higher than in summer.	Food in winter 25% animal matter, in spring 80%. One stomach reported to have had 1629 cankerworm eggs in it. Insects eaten may be injurious or helpful, but on whole bird is considered as being useful. Particularly useful in destroying caterpillars in orchards. Codling moth pupae popular winter food.	Works head up or down on large parts of tree, gleaned food from small animals in and on the bark. Beetles seem to rank high in popularity. Seeds of spruce and balsam are stored for use as food. May store food, particularly in the vicinity of man-made feeding stations.	Food, insects and insect eggs gathered from bark of trees and branches of trees. Included are moths, caterpillars, leaf hoppers, ants, spiders and some pine seeds. On occasion, may feed on suet found at feeding stations. Nest is built almost wholly by the hen bird but male brings food to mate and young.	Food, insects found chiefly on the bark of trees and including caterpillars, scale insects, gypsy moths, click beetles, plant lice, forest tent caterpillars. Call is a thin, wiry sound inaudible to many, 5300-8050 c.p.s. May feed head up or head down, and work up or down a tree trunk.
Essentially beneficial as a destroyer of insect enemies of trees and similar plants. Popular with naturalists because of vigorous whistling call and because of friendliness and apparent lack of fear. It is the State Bird of West Virginia, and would rank high elsewhere if its range were greater.	The yank yank nasal call is reasonably well known by the average bird watcher. The behavior of feeding on a tree trunk, head up or head down has given rise to many common names, such as "upside down bird" and "devil twirl around the twig." One of the commonest visitors to bird feeding stations in range.	Surprisingly tame and may feed close to a man in the field. Highly useful, obviously, as a destroyer of insects that infest the bark of trees. Because of its small size and general appearance is frequently overlooked by the careless bird watcher, but it is usually welcomed on a bird list.	Probably wholly valuable. Also probably more common than most persons appreciate because its habits make it inconspicuous. Has the habit of working from bottom of a tree to top, then dropping to bottom of next and beginning all over again. Its fine call cannot be heard by many because of its high pitch.	Undoubtedly of value as a cleaner of tree trunks and in the destruction of harmful insects. The habit of nesting on the ground at the foot of a tree makes it doomed in areas in which house cats are abundant and there are those who definitely favor this bird to any cat.

(Continued from page 139)

itself to digging in wood for its livelihood, why should it spend so much of its time on the ground catching ants as they come from their burrows? We might go on in this vein, but I hope that we have made our point.

It is true that most, if not all, of our woodpeckers require burrows in wood to make a nest and rear a family, but there are many animals with similar needs that could not dig a hole if their lives depended on it. Chimney swifts, wood ducks, bluebirds and many other species manage to survive by using holes on rotting parts of trees, or by using the holes in chimneys. Why should woodpeckers be called upon to dig most of the holes for other birds?

If you ever watch a woodpecker at work you may notice that it frequently pauses in its operations and appears to listen to what is going on in the wood before it. There seems to be little doubt but that they do use a sense of hearing to help them locate an active supper. I once talked with a teacher in far-off New Zealand who told me that he did not believe that birds listened to things moving in the ground. He said that he had seen birds poise on the ground before catching earthworms, and that, while the birds seemed to listen, he had put his ear down at the same spot and had heard nothing. He forgot that hearing by birds and hearing by mammals may be a different sort of thing, and that even the sensitivity to sound waves of different human beings varies greatly, and that it varies with age, even in a single human being. As a younger man I could always readily hear the calls of blackpoll warblers and the high-pitched calls of brown creepers. Now I am lucky if I am able to detect these sounds and yet I can hear quite well. To me it seems obvious that woodpeckers, at least, use their sense of hearing to help them locate a meal. Some, as with those that catch insects on the wing, use highly developed sight and aerial skills as well.

It might be easy to say that, since these birds do such a wonderful job in controlling tree-destroying insects, that they are entirely useful. Some of them, however, have developed good appetites for sweet corn, for cherries, for nuts, for peaches, and for the young of other birds, even including young chickens. We can hardly appreciate their satisfying these appetites. Some of them, like the California woodpecker, store acorns in telephone poles and in live trees to such an extent that they have been accused both of injuring the acorn crop and of injuring the wood in which the acorns are stored. Surely the hole-digging ability of some of the woodpeckers does not increase their popularity. I have had two grape arbors riddled by woodpeckers that dug winter resting holes in them. I know a friend who had the siding of a relatively new house punctured by woodpeckers. He does not like woodpeckers at all. I once slept on a sleeping porch that had a metal drain pipe that



DOWNY
WOODPECKER



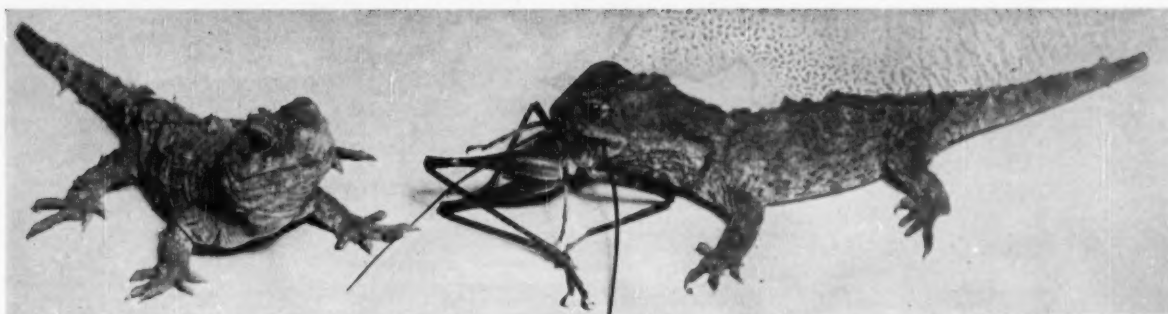
WHITE-BREADED
NUTHATCH

was selected by a flicker as a sounding board with which he told the world what a big guy he was. I did not appreciate his activity at 4:30 on an early summer morning when I had been out the night before. And so, you see, we can if we wish find many things that woodpeckers do that we do not appreciate. I rather think that this is common to all living things, including ourselves. Somehow to me it is difficult to bring any serious indictment against a chickadee or a black and white warbler that may come into our picture of feathered tree dusters.

We have mentioned the fact that many of our woodpeckers dig nesting burrows in trees to help in bringing up their families. While a nest may help a family survive it may also contribute to the extinction of a race. Some have suggested that one of the reasons the ivory-billed woodpeckers may have become extinct is due to their nesting habits. With the spread of lumbering operations, the number of suitable nesting sites for these marvelous birds has become reduced. This may mean that a bird, which would normally build a new nest burrow every year or so, is forced to use the same nest year after year. In some ways it would appear to be sensible to use a nest hole for more than one year, but this may not be the case. A nest hole used one year may become badly infested with the natural parasites of the bird. If the nest is not used every year these parasites may die out because they cannot get their food. However, if a nest is used frequently the parasite popula-

tion may build up to such a point that it is practically impossible for a bird to use the nest for rearing its helpless young. I am not saying that this is the deciding factor in the disappearance of the ivory-bill, but it may well have been a contributing factor.

With the disappearance of superior environment, the ivory-billed woodpeckers vanished, but you cannot say that because the woodpeckers vanished the suitable forests disappeared. Similarly, while it may sound reasonable to suggest that our little downy woodpeckers do help out orchards, it would be dangerous to say that we cannot develop good orchards without the help of downy woodpeckers. Stories about tree sparrows destroying tons of weed seeds in Iowa may suggest that, but for the tree sparrows, Iowa would be wholly weeds. As a matter of fact, it is doubtful if the work of the tree sparrows has much effect on the weed population of Iowa. Similarly it is probably doubtful if the presence of woodpeckers has much effect on our orchards. In spite of these arguments pointing to the possible idea that these birds are not necessary to the economy of our woody plants, I still would hate to think of a world without them. If we admire workers as I do, we must admit that most of these birds really earn their living. Maybe trees can do without woodpeckers, nuthatches, creepers and titmice, but I cannot.



First Tuataras Reared in Captivity

FOR THE first time in history the tuatara, unique reptile found only in New Zealand, has been successfully hatched and reared in captivity. Two of these rare creatures, related to the dinosaurs, and sole survivors of a life-form more than 100,000,000 years old, are now thriving lustily at Victoria University College, Wellington, under the care of W. H. I. Dawbin, lecturer in zoology.

Other tuataras have been hatched in captivity, but none ever survived for more than a few weeks. Thus a systematic study has previously been impossible, and information about the tuatara is scant.

Although much like a lizard in habits and appearance, the tuatara belongs to an entirely different class. It is, in fact, the sole surviving member of the order of *Rhynchocephalia*, which lived on this earth long before man, and shared it with the dinosaurs, ichthyosaurs, iguanodons and pterodactyls. Its scientific name, *Sphenodon punctatus*, derives from one of its chief characteristics—a ridge of spines, or, rather, skin-folds, along its back.

Adult tuataras grow to about two feet long, and the young, when hatched, are only about two inches. They emerge from roundish, drab-white eggs about the size of ping-pong balls, and take from 14 to 16 months to hatch—a length of incubation quite without parallel. The reptiles are nocturnal, sleeping during the day in caves or burrows, which they often share with sea-birds. They eat flies, insects, spiders, grasshoppers, and similar small ground-prey. With the onset of winter, the tuatara loses appetite, and retires to hibernate until the spring.

Having the tuataras under observation is adding

to zoologists' knowledge of the reptiles' habits. Main discoveries so far have concerned their hatching and burrowing habits, and their liking for independence. Some popular fallacies have been dispelled—for example, the belief that tuataras will not drink water. Ancient fossil forms have been semi-aquatic; and live tuataras, though never known to swim, are actually fond of water, and drink plenty of it.

Though reputed to live to a fabulous age, the tuatara has never previously been tagged, so real facts on that point, too, are nil. A specimen once died after 77 years in captivity; but that was an adult when captured, so its real age is unknown. Although by no means vicious, young tuataras occasionally "nip" with their three rows of strong teeth, two in the upper jaw and one in the lower. Adults are capable of biting through a pipe-stem. The teeth are not separate and detachable, like those of mammals, but form sharp, serrated projections from the jawbone.

Once every year the tuatara sloughs its skin, or "moults," appearing then in a bright new garb of olive-green with lemon spots; but the skin gradually dulls to a uniform brown. The head is large, the body solid, legs short and weak. The tail when intact is about five-eighths of the total length; but the tip, very often, is bitten off. Prominent spines run along the middle of the back from crown to tail, and stand erect with formidable appearance—though in fact they are soft and flexible, being not true spines, but folds of the skin. Formerly found in the North Island of New Zealand, the species is now confined to some 16 islets off the coast of North Auckland and the Bay of Plenty, and also dwells on a few small islands in Cook Strait.

Problem Child

By ALMA DENNY

March is the boy who stands his ground;
Takes after Winter, stolid sire;
Teases his mother, Spring, who weakly
Says, "It is time now, to retire."

March likes to dawdle, hide, and then
Plans that his valedictory yape will
Be to suddenly re-appear
When everyone waits, expecting April.



The Conservation Car of the Canadian Forestry Association is a standard Pullman that has been remodeled into a theater and lecture hall. It is hauled wherever the railways lead and on a definite schedule.

Canada's Conservation Caboose

By FRANK A. TINKER

FOR one day the village of Moosonee, on the remote shores of St. James Bay in northern Ontario, became a community imbued with the warm message of conservation. Also it enjoyed the feverish excitement of seeing a good show.

In places like Moosonee, served transport-wise only by the Ontario Northland Railway and the canoe portages of the Moose River and its tributaries, good movies are not frequently, if ever, seen. Thus, on this occasion, as in other isolated villages along the wide-flung network of Canada's railways, the word went out via the bush telegraph, or moccasin broadcast. At the appointed hour of eight, both the village population and the Indian camps for miles around had gathered at the railroad's end. The reason was the visit of the Canadian Forestry Association's new Conservation Car, the traveling theatre by which the

word of fire prevention and general conservation will be borne to more than 150,000 heretofore unreachable Canadians annually. When the evening show was over, lecturer Paul-Emile Pageau had spoken his piece to the rapt and understanding audience that crowded the car. The Indian mothers had buttoned their blouses and captured their adventurous, crawling offspring. And it appeared that the car was launched on an assuredly successful career.

The Conservation Car itself is basically the standard, 85-foot sleeping variety, converted by the Canadian National Railways into a rolling theatre and lecture room. Complete with projection booth and seats for 56 persons, it is an entirely self-contained unit, generating its own heat and light from Diesel auxiliaries while standing detached from the parent train. Refurbished at a cost of \$250,000, it is being hauled and serviced free of charge by the CNR, after having been formally donated to the Canadian Forestry Association by that company earlier last spring.

Actually, the car represents a sound investment for the railway, since the company itself is both a large user of lumber products (\$30,000,000 worth in 1953), and derives much of its income from the transport of goods and materiel to the lumber areas, as well as shipping out more than 900 million tons of forest products annually. In addition, the factors

Full houses are the rule for the car, with as many as three shows being run during an evening to accommodate the overflow.





By way of the moccasin telegraph, Indian bush dwellers learn of the schedule of the Conservation Car and set up camp near the railway in typical Cree summer style in order to be on hand for the show.

of tourism, hydro-electric development, and general employment level, all of which have an immediate bearing on a railroad's welfare, are governed by a sustained forest supply. Thus the railway's stock in conservation education for Canadians is large, particularly now when it is recognized that such education is genuinely effective. Another car, dubbed the Tree-Planter, has already completed thirty years of touring the western prairie provinces, assisting communities and individuals, wherever necessary, in developing windbreaks, watershed cover, and small commercial stands.

At first reading, the idea of taking such a conservation lesson to the hinterlands, where the welfare of every individual is so obviously bound to that of the surrounding forest, appears fantastically unnecessary. So it was assumed to be, until 1950, when a survey revealed the surprising fact that the native inhabitants of the forest areas were often the most careless in the matter of fire prevention. Some 43 per cent of the fires of recent years were started by fishermen and campers but many of these came from the area's villages and lumber camps, the culpable tourists being in the minority in the more remote regions. The need for conservation awareness at home, as well as in the cities, was made definitely apparent by this survey and others, and the Forestry Association has planned accordingly, the new car being part of that plan.

Of course, much more than the fire prevention story is told to the many villages that the car is now visiting. A typical show, which may be repeated three times in one evening so that the Conservation Car may

maintain its crowded schedule, consists of an educational short film on budworms and their control, a dramatic documentary on the large fire in Maine, several seasons ago, with lessons learned therefrom, and Walt Disney's feature "Water Birds," which is advertised as the main attraction. In addition, bilingual Mr. Pageau adds short comments to point up the message contained in the entertaining program.

Faced with these audiences, his job is not so much to impress upon them the value of conservation as it is to remind them of their personal stake in the forest, and of how precarious that stake may become. The instructional part of the talks is highlighted for the practical inlanders, however. In conversational, sincere fashion he tells them that if they know nothing about fighting a forest fire they probably would do best, both for themselves and the forest, by staying away from it. It is a dangerous undertaking, he explains, and one that, from the standpoints both of effectiveness and personal safety, requires at least a thorough knowledge of what is trying to be done and what is definitely not to be done. With this appeal



Small fry along the route of the car are interested in the pictures of wildlife and forest. In some villages it is the first movie to be seen.

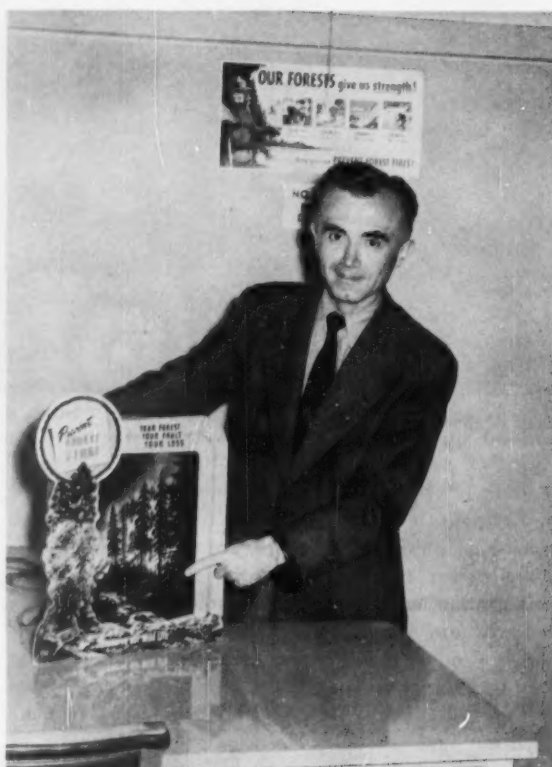
to their pride as woodsmen, the subject is taken out of the category of show, or lesson, and becomes a vital matter to the lumber worker or trapper.

An idea of the importance of the fire problem and conservation education in a region such as Ontario, where 30 percent of the economic dollar comes from the forest products, is given by W. S. MacDonnell, secretary of the Canadian Forestry Association. In 1942, according to the figure of the Association, there were 210,000 forest fires in Canada. Ten years later, during 1952, although there had been a 50 percent increase in the use of the forest areas, there were only 20,000 fires. Undoubtedly, prevention education had played a large part in this reduction, since the information disseminated on this subject had increased by twenty times.

Much of the Ontario forest industry is in pulpwood, jackpine and spruce predominating, one acre of which is estimated to place \$1500 in motion in the Canadian economic world when harvested. Since 483,000 acres of this growth are burned every year, the total primary annual loss to the nation is the staggering amount of \$724,000,000. Moreover, when it is realized that the pulp forests are cut according to calculated annual growth, in order to insure a continuing yield, and that the forest is depended upon to perpetuate itself indefinitely, the cost of such fires over the long run becomes almost immeasurable in terms of dollars.

The Ontario Department of Lands and Forests operates one of the largest and most efficient fire control networks in the world. This organization has a yearly administration budget of \$13,000,000, which includes only part of the cost of actually putting out the fires. In comparison, only a half-million is spent in prevention measures, including education, during the average year. Proponents of increased education facilities point out that the government is losing in both ends of the deal under the present scheme, since there is the constant and now almost static number of fires, with their attendant losses, and the increasing cost of controlling them.

Apparently more than one large company and independent organization agrees with this thesis, judging from the appearance on the rails of the new Conservation Car. Since the Forestry Association forwards its time schedules to the enthusiastic district rangers along its intended routes, and has arranged



Paul-Emile Pageau, bi-lingual lecturer of the Canadian Forestry Association, gives the pep talk in whichever language is necessary.

that the car can be converted for use in disasters at a moment's notice, it is assumed that it will play its part in this more spectacular field during its travels.

Of inestimably greater importance, however, will be the spreading ring of conservation-minded villagers, fishermen, lumbermen, and woods-runners it will leave behind during its continuing sojourns. At present it is scheduled to tour Ontario, Quebec, Nova Scotia, New Brunswick, and British Columbia. It is one show to which no ticket can be purchased and to which few of the readers of this magazine will have the opportunity to go, unless their travels take them far from the usual passages. But it is also one without which Canada and her forests would be much poorer, and the Cree Indians of Moosonee would never see a flamingo in flight.

Spring at the Siding

By ALLEN E. WOODALL

Spring came down the railroad track
Toward sunset on a winter day
Waking up the small green leaves
Where the rails were sleepy gray
Answering a sky of fire,
Answering a wind of change,
Call of dreams, of old desire,
The old brown earth was fair and strange.

Elfin World of the Dunes

By CLAIRE SHAY

Illustrated by Kathleen Shay Crawford

THE mid-arch of Santa Monica Bay, in southern California, gets strong west winds. It faces the open Pacific, and is in the path of a "desert draw" to the east. Here the beaches of the small cities of El Segundo and Manhattan Beach have been wind-sculptured; piled into hundred-foot sandhills. The tops of these hills are constantly blown inland to create a sandy-soiled back country of rolling hill and hollow.

A pleasant memory of early days in Manhattan Beach is the beautiful elfin world of the dunes, now almost vanished. They were a view of which we never tired, with their high, pale shoulders ruffled by the wind and airily draped in thin shawls of dark green deerweed and silvery gray lupine.

We enjoyed dune walks in those early days, and for many years they remained an enchanted world while the toddler of the family grew to ten years and older and rode first her burro, and then her buckskin horse, over "Jackrabbit Fields," and "Mystery Gulch," as she named some dune spots. It was a world of silence, broken only by birdsong and the voice of the ocean. Mockers sang, meadowlarks caroled and hummers zizzed about, visiting tarweed or yellow isomeris flowers. Long-legged, round-headed little burrowing owls, less nocturnal than other species, stood at the doors of their homes, goggling with round yellow eyes. They were plentiful in the back country, also, perching on fences in the day time and holding odd little bobbing courtship dances by moonlight near our garden. Mourning doves haunted the dunes, too, and rose on whistling wing from almost under the burro's or horse's feet. Killdeer families lived there, their nests only slight hollows in the sand, and the baby killdeer would run after the parents on little stilty legs. Pretty creatures with their two black breastbands on snowy shirtfronts, these little plovers later liked to congregate on the green lawns of the local city hall.



Gray-leaved lemonade sumac grew almost matlike on the dunes.

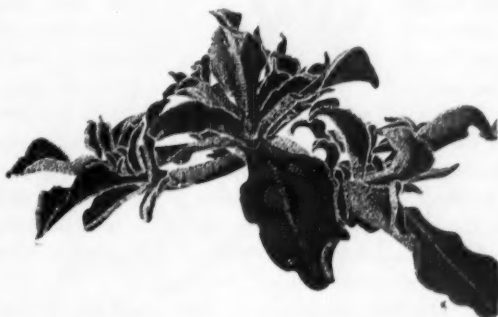
The dunes were our local range of "mountains," an elfin sandrange from whose summits one viewed in winter snowy mountain peaks far to the east, and, westerly, the vast ocean close at hand. All the plant dwellers grew dwarf in desert dryness and whipping wind; the highest "trees" were eight-foot elders.

The "chaparral" of our miniature mountains was rich and varied for a bleak beach scene. The most abundant shrub was four-foot mock heather, *Aplopappus ericoides*, with little needle leaves. It had insignificant but pleasing yellow composite flowers in late

summer. Other shrubs of the dunes were pleasing gray-green *Isomeris arborea*, whose large, deep-yellow flowers were followed by papery, inflated, rattly pods, and coast encelia, which was a wild sunflower of spreading habit. The rhus or sumac family was well represented in the shrub squawbush with its three-lobed leaves and the semi-scandent poison oak, while the gray-leaved lemonade sumac, *Rhus integrifolia*, grew almost matlike to a foot and a half high, five or six feet across, and was duller and smaller of leaf than when growing in the canyons of the mountains. All three bore berries well liked by the dune birds, those of poison oak a particular favorite. There was a great deal of tumbleweed and deerweed. The latter was extremely abundant, giving a verdant effect with its small, dark-green, feathery foliage. It bloomed for a long time in spring and summer with tiny yellow and

orange pea flowers. Beach-bur grew low along the ground, with much-divided silky gray leaves, and raising inconspicuous spires of greenish disc flowers in late summer and fall. We still remember that the burro liked beach-bur and tumbleweed, and the horse poison oak and mock heather.

Perhaps the most beautiful plant in the dune world was beach lupine, ours being a small-growing species found along the California coast from Los Angeles County to San



The beautiful ice-plant had wavy, dark-green leaves tinged with reddish and studded with shining crystal dots like ice.

Francisco County. The little gray leaves were silver-silky and the dainty, abundant and fragrant flowers were lavender. Another beauty of the dunes was beach primrose, covering large expanses with its silky-gray foliage and sunshiny yellow flowers. It grew prostrate, the pinkish stems radiating from a central rosette, and it bloomed much of the year, its inch-wide flowers opening toward late afternoon and staying open on foggy mornings. The seedpods were curiously bent into a spiral.

A third outstanding abundant beauty was sand verberna, of which there were two species. *Abronia umbellata*, which also grows in the desert, had flowers of rose-purple, while *Abronia maritima*'s flowers were darker and more red. Both gave sheets of color in spring and early summer. The kidney-shaped leaves were thick, flat, succulent and rather sticky. The plant grew prostrate, with long stems running over the ground, and the colorful flat umbels of flowers were some three inches across. Still another beauty of the dunes was the lovely little beach morning glory with round, dark-green, small leaves, somewhat like a violet leaf but of a thick succulence. Its silky flowers opened from lavender-pink bud to inch-wide, white flower.

There were several pleasing succulents on the dunes, the most striking being the beautiful ice-plant, *Mesembryanthemum crystallinum*, with its big, wavy, dark-green leaves tinged reddish and studded with shining crystal dots like ice. This plant flowered with half-inch, fringy white flowers in spring and early summer. It is southerly in its range, along the coast from Santa Barbara down into Baja California, and it grows abundantly on the offshore islands. The coast prickly pear, *Opuntia littoralis*, grew dwarf on the dunes and was a hazard to be watched for, but hummingbirds liked its summer-blooming yellow flowers.

Numerous on the dunes were the *Echeverias*, or *Dudleyas*, the dune species being *Echeveria lanceolata* with long, pointed, wide-lanceolate leaves, thick and gray-green, pink-tinged on the edges. The little succulent plants grew in rosettes six to eight inches high. In summer they began throwing up stalks, interesting with their alternating soft leaflets spaced an inch



Echeveria lanceolata in bud and, below, in bloom, was a lovely dweller of the dunes. The starry flowers are ruddy outside, yellow inside.



apart up the stems and each facing in a different direction, giving a starry effect. At a height of two feet the stalks, now bare of leaflets, were crowned with three-inch, loose panicles of dark-pink buds, which opened to small starry flowers, ruddy outside and yellow inside.

A native fig-marigold also grew on the dunes, a strong-growing subject that bloomed in spring with wide, fringy, lavender-pink flowers. It grew among garden-escaped "Hot-tentot fig," another species of fig-marigold, and they had hybridized freely. Some plants had lavender-pink flowers, some yellow-tinged-pink and others large, pale-yellow ones suggesting waterlilies. This rampant, hybridized succulent is the most characteristic plant in the southern beach landscape, and useful as a soil-

retainer on steep banks. Pieces thrown out with the winter rains rooted and grew in our back country and soon covered large expanses with their heavy-stemmed, finger-leaved masses.

On the more exposed dune slopes directly facing the ocean grew sand verberna, primrose, morning glory and the crystalline ice-plant, true ocean lovers that did not like to live inland on the dunes. A short distance inland from the ocean they associated with lupine, prickly pear, *Echeveria*, the various dwarf shrubs and dwarf elder. Here, in springtime, the clustered, purple-blue flowers of cluster-lily, *Brodiaea capitata*, rose from their bulbs on long, bare stems. The fragrant, yellow, wild wallflowers grew in airy masses, and there was a pale-lavender, annual, *Phacelia*, with hairy, curled bud-clusters. The color harmonies of the dunes were always pleasing. One such was furnished by the sunshiny dwarf annual *Chaenactis*, blooming in sheets of yellow disc-flowers among rose-purple verbenas and yellow primrose. These three still may be seen growing in vacant sand lots between houses, and the crystal ice-plant still persists along sand-bordered, ocean-facing sidewalks.

The plant life of the dunes adjusts to its conditions much as does that of the inland deserts. There is the same adjustment to wind in a thickening and toughening of leaf to withstand evaporation, and the same root

adjustment to drought. The rainfall of our beach is scanty, averaging less than twelve inches a year, but fog is abundant. The plants have learned quickly to drink the fog, to store water in their succulent bodies, stems and roots, or, in the case of shrubs, to send long, wandering roots through large areas of sand in search of every droplet. As in the hot desert, the dune dwellers grow well spaced, so each can have a chance.

Some plants, as the prickly pear, have short taproots but wideflung surface roots, which drink water quickly; others, like sand verbena, have water-storing roots like four-foot, elongated parsnips. Some dainty subjects with small tops have surprisingly large root systems, such as lupines, which send their ten-foot roots wandering over a large area. Plants of the inland desert have much the same economy, storing water in body, stem or root. Some shrubs and small trees, like desert tea, creosote bush and mesquite, send disproportionately long roots down to tap subsoil water.

The coarse, sharp sand would seem to contain little nourishment, but through the years the whipping ocean winds dry and buffet, but also do a service in blowing organic particles to the growing things—pulverized kelp, gull droppings, beached dead sea life. The rains wash this food down to the roots, and the plants themselves add humus to the sand with their dead leaves and stems. Thus the sturdy subjects sustain themselves and give sustenance to small sand dwellers; to birds, field-mice, jackrabbits, cottontails, insects, garter snakes and lizards.

Although our local bit of dune world has vanished, the Empire of the Dunes is extensive. It is a fascinating region to explore, the ocean dunes extending brokenly from the Washington and Oregon coasts down into Baja California, and the desert dunes holding sway in Arizona and in the Mojave and Colorado Deserts. An interesting aspect of the northern ocean dunes is the



Fig-marigolds grew on the dunes, hybridizing freely to produce lovely blooms.

fine-grained, soft, black, gold-bearing sand of southern Oregon and northern California, in contrast with the coarse, crystalline, light-tan sand of the southerly beaches.

Our particular little dune world vanished imperceptibly and gently. Perhaps we were too busy to watch "progress" from day to day. Rabbits became scarcer as the dusty, back-country roads were paved one after another. We noted from time to time that we no longer saw big ears popping up from behind clumps of phacelia, or little white tails twinkling up the road. As quail became scarcer in the back-country; our garden became a bird sanctuary and they lingered longest there. As long as some of the lovely sandhills still remained we cherished a dream of a local dunes park, but knew the little city would never consider it. Then the paper announced, "Barren dunes soon to blossom with 1200 homes!" And the young member would return from rides indignant that a house was now going up in "Golden Meadow," or "Owl Hollow," or some such spot. All the little dune

creatures probably slipped away in orderly fashion by ones and twos in the quiet nights—rabbits to still-wild land in Palos Verdes, some six miles south, while burrowing owls could retreat two miles north where El Segundo still has some expanses of dune.

Our countryside is no longer suitable for quail and meadow-larks, but mockers and hummers are adaptable, and mourning doves still persist in large numbers, nesting in tall eucalyptus trees and commuting daily to valley country inland for their food.

The enchantment of the elfin world still lingers in memory's pictures—the pale, beautiful, sand piled in sculptured curves and sweeps, its hummocks tufted with sparse vegetation and slopes adorned with delicate tracery of verbena; the fuzzy brown burro stepping daintily over the sand on tiny feet; a little owl with golden eyes near a golden mass of wallflowers.



Perhaps the most beautiful plant of the dune world was the dune lupine, its flowers dainty, abundant and fragrant.



A Dogfish Story

By DOROTHY GORDON COX

IT HAPPENED on the beach at Sunshine Camp, by the landlocked inner harbor of Sooke, just about the most southerly point on Vancouver Island. It is a fish story, sad yet full of wonder and beauty.

It was after supper and the children were playing quietly on the beach. Suddenly the quiet was shattered by shrieks of excitement and the youngsters came running from the beach carrying a large, odd-looking fish. The fish—a dogfish—was still alive but so injured that it was dispatched and carried to the beach where, with a dull butcher knife, we performed an autopsy. The skin was rough, thick and tough, but an incision was finally made and then came the thrill—a number of truly beautiful young ready to be born!

Beneath the rather repulsive exterior of the dogfish it was colored deepest sea-blue and the soft green of willow leaves, veined with rose. The children's excitement gave place to awe; noisy chatter to silence. Ten of the fourteen wee fish were removed from the snow-white egg cases, gasping in the chill air. One boy ran to the house for a pan and all the young were placed in sea water and rushed to the kitchen and into

the still-warm oven, for the children were so anxious to try to save the fishes' lives.

Attached to each fish was the large, oval egg yolk, enclosed in a network of veins of hair-like fineness. The tiny fishes swam rapidly despite the handicap of the membrane-enclosed yolk and were perfectly at home in their new environment except for their breathing. They were not ready for water as the gills were not yet open, and they continued to gasp as though breathing through their mouths, yet they did not drown immediately. We kept them warm and the children went off to bed still hoping. They were disappointed and sad when in the morning they saw the upturned bodies of the young dogfishes. One can not interfere with Nature to the extent that we had hoped.

The little fishes were beautiful—soft, pearl-gray, striped and spotted with white. We arranged the little bodies and took a picture before burying them in the sand, and we were sorry the mother had been needlessly killed. Surely, however, she had accomplished more than others of her kind for we had learned a great deal, and the children will not forget that Nature lesson.

Night Magic

By NANCY COY

Hist, hist and roundabout,
Let no moon spy us out,
Let no breeze carry word
To the ear of waking bird.
Mouse and mole, rabbit, we
Frisk about the pinewood tree.

Let owls doze, we'll be quick
Fur to quiver, tail to flick,
Eager tooth to nibble husk
In the shadow, in the dusk.
Mouse and mole, moth make three
Underneath the pinewood tree.

Human ears are shuttered tight,
Human eyes must choose daylight,
Will they wonder at our mark
Pattered softly through the dark?
Mouse and mole, rabbit we
Frisk about the pinewood tree.

Fugitive Ornithological Journals

By W. L. McATEE

THAT is the title under which I wish to write, for it was a phrase often heard from my elders in the Biological Survey around fifty years ago. In it, the word "fugitive" had a nostalgic tone, and such meanings as transient, fleeting, or evanescent, which evoked sympathetic interest. What were these journals? Why were they fugitive?

The persons speaking of them were harking back to their younger days, an era in which collecting of all kinds absorbed youthful energies and employed time in ways their present-day parallels devote to automobiles, movies, radio, and television. Then, nearly every boy had a collection of bird eggs; many gathered Indian relics, stamps, or coins; and interest in taxidermy was widespread. There was a fad, too, of personal journalism, in which young men gratified their desires to be editors or printers, or both.

There resulted a spate of publications meant primarily to facilitate sale and exchange of curios, a considerable proportion of which were devoted mainly to natural history, in which field the bird interest was strong. There were earlier, there have been later, ventures in amateur publications on the sciences, but in those days they were more often sponsored by individuals than in recent times, when they have been promoted chiefly by organizations.

Inspiration led many into minor scientific journalism, but "perspiration" was involved, too, as all chores, from gathering or writing copy, to type-setting, printing, illustrating, and distributing the periodicals, were the lot of the self-appointed editors and publishers. Their spirit is shown by subtitles such as "A Journal for those who study Nature from a love of it;" and salutations to readers like: "Go forth under the open sky and list to Nature's teachings," and "Ye who love the haunts of Nature, love the sunshine of the meadow, love the shadow of the forest,—listen."

These quotations were gathered by the late Frank L. Burns, who deserves to be recognized as the patron saint of the lesser scientific journalists. In "A Bibliography of Scarce or Out of Print North American Amateur and Trade Periodicals devoted more or less to Ornithology" (Supplement to *The Oologist*, July, 1915), Burns gives the history of one of the most successful of the fugitive journals, also called *The Oologist*, which was published in Utica, New York, and Rockville, Connecticut, from March, 1875, to November, 1879.



The Petrel was one of the fugitive ornithological journals that achieved only Volume 1, Number 1, and is a collector's item.

"This," writes Burns, "is the pioneer amateur oological periodical of America. S. L. Willard, a typical American boy of about sixteen years, after conducting an ornithological department in *The Repertory*, a western amateur paper, became convinced of the need of a serial devoted to birds and their eggs, and without help, no money, and little experience, engaged the services of an unemployed printer, and began the publication of this little paper. The first two issues were not only typographical failures, printed with coarse type on thin paper . . . but the subject matter trite . . . it received severe criticism, and the discouraged editor, at a loss to pay the printer, withdrew the publication. However, several inquiries for sample copies from surprisingly remote localities and one or two press notices, awakened a fresh determination to proceed. For the third number, he invested in a bit of engravers' boxwood and carved a heading; at the same time he added a small font of type, sufficient to compose a single page, and negotiated with a boy friend to print it . . . one page at a time. Five numbers were issued in this way during spare hours from school, when, his

friend having disposed of his press, it became necessary to do the printing elsewhere. From his plans, a local blacksmith built a press with a capacity of just one page, on which the next four numbers were printed.

"It must be remembered that the editor was under the necessity of composing the bulk of the reading matter . . . particularly in the early volumes . . . Beside writing under his own name, he published . . . essays for the editorial pages. Under the nom de plume of 'Ovum', he published a series of papers entitled 'Birds' Nests and Eggs', which ran for three years . . . Considerable also appeared over the name of 'Avis'. Over fifty woodcuts [appeared] during the series, most of them . . . the work of this enthusiast . . . Beginning with the fourth volume, the periodical attained the dignity of a cover and an engraved design . . .

"The five volumes required just six years to publish. This little magazine . . . is quite scarce. I know of only two or three complete sets . . . one set collected recently, after much . . . advertising and correspondence, represented an outlay of almost \$50 . . ."

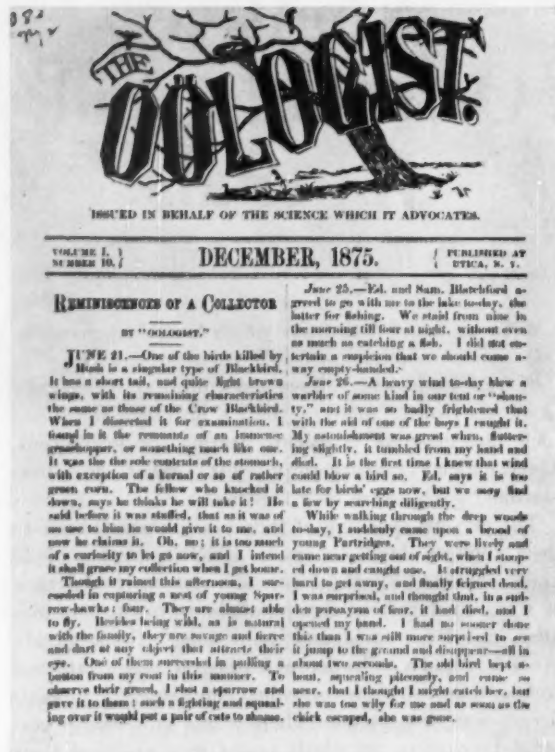
What could not the young editor have done with fifty dollars? The usual annual subscription prices of these little journals were 25 and 50 cents; some were as high as a dollar, but one was noted as only 20 cents a year. But be it remembered, that was when a dollar was a cartwheel and could go places.

Many of the periodicals of this class were primarily intended to facilitate exchange, so the number circulated was an important factor. Some guaranteed a thousand copies, or, doubtless optimistically, claimed more. Of one, twenty thousand were sworn to have been circulated, yet it was in print only two years. Of another, which lasted four years, it is known that never more than six hundred copies were printed.

Failures were the rule; one form of exit was to sell out to a new hopeful, who would fill unexpired subscriptions. Mergers were common, and the union of up to five old, into one new, periodical is known. Warning signals of the end included reduction of the already amazingly low subscription prices and change from monthly to bimonthly issue; sometimes the wind-up came quickly with a double or triple number. Editors said, "we can't spare the time;" "schooling requires all our energies;" or with total frankness, "we can't exist on wind." The most common reason for suspension was lack of support (i.e. subscribers), but an official "out" was inability to get second-class mail rates, probably because the proposed periodicals contained far more advertising, than literary, matter.

There were possibly two hundred of the fugitive journals in the eighties and nineties of the past century, a high proportion of which were short-lived. The extreme, of course, was attainment of no more than Volume 1, Number 1, status. We have noted fifteen such instances (including two slightly out-of-bounds) and herewith list them with localities and dates:

American Collector, Oak Hill Ohio, 1888; *American Ornithologist and Exchange*, Paw Paw, Ill., 1891;



The Oologist was one of the best known of the fugitive ornithological journals.

Canadian Ornithologist, Toronto, Ont., 1873; *Collectors' Advocate*, Cincinnati, Ohio, 1888; *The Eagle*, Frankfort, Ind., 1891; *Greetings from Nature*, Wareham, Mass., 1885; *The Gulf Fauna and Flora Bulletin*, Ruston, La., 1899; *The Hummingbird*, Sans Souci, N. C., 1890; *Naturalist*, Des Moines, Iowa, 1893; *Naturalist*, Mackinaw, Ill., 1894; *Naturalists' Review*, Boston, Mass., 1895; *North American Naturalist*, Newark, N. J., 1896; *Our Birds*, Holyoke, Mass., 1885; *Petrel*, Palestine, Oreg., 1901; *Young Naturalist*, Chicago, Ill., 1886.

The names of the hopeful magazines present some points of interest. There were more called after birds than is indicated by the preceding list, as the *Bittern*, *Curlew*, *Loon*, *Osprey*, and *Owl*. Two editors had the conceit of small format for papers dedicated to small birds: *The Hummer* (4 x 6 inches) and *The Hummingbird* (3 x 4 inches).

The editors were locally, rather than widely, experienced, and some reiteration of titles resulted. Thus there were two each of: *The Bittern*, *The Owl*, *The Young Naturalist*, *The Young Oologist*, *The Young Scientist*, and *The Wisconsin Naturalist*; three each of *The Collector* and *The Museum*; and five of *The Naturalist*.

Practically all the men whom we recall as major figures in a past generation of American ornithologists, wrote, in their earlier days, for the fugitive natural

history journals. Naming them would be but calling the roll of the older ornithological leaders. In passing, it should be noted that a whole galaxy of these stars (nearly everyone in Washington, 1898-1902, who was eminent in bird study) could not assure continuance of *The Osprey*, moved to the capital from Galesburg, Illinois.

It is of more than ordinary interest to note that many who succeeded in other fields had a youthful fling at ornithology. The names of a number of them and the disciplines in which they made their marks are: W. H. Bergtold (medicine), Frank E. Blaisdell (beetles), W. S. Blatchley (entomology), John Burroughs (nature writing), Hubert L. Clark (echinoderms), Willard N. Clute (ferns), Charles Dury (beetles), Barton W. Evermann (fishes), G. Brown Goode (scientific administration), Edmund Heller and Ned Hollister (mammals, zoological gardens), Frank H. Knowlton (fossil plants), Morton E. Peck (botany), Hugh M. Smith and James O. Snyder (fishes), Leonard Stejneger (reptiles), George B. Sudworth (trees and shrubs), Thaddeus Surber (fishes), John Van Denburgh (reptiles), Lester F. Ward (botany, philosophy), and Steward E. White (fiction).

We can even offer a bit of gossip from the field of this article. Joseph M. Wade, who conducted the *Ornithologist and Oologist* (successor to Willard's *Oologist* for some years), wrote and tried to suppress a sheet (Nov. 1883), entitled "Plain English," in which he commented caustically on the personnel of the Nuttall Ornithological Club and the newly organized American Ornithologists' Union. Doubtless the degree of recognition of oology and oologists by these societies was

not considered adequate. That rankled R. M. Barnes also, and from time to time through the years he dropped remarks critical of the Union in *The Oologist*, which under his sponsorship (1909-1941) became the longest lived of all the magazines of its class, achieving 58 volumes, beginning as *The Young Oologist* in 1884.

Started chiefly to be of service to collectors, the fugitive ornithological journals themselves became objects for collecting. Among persons most successful in this pursuit were: Frank L. Burns of Berwyn, Pa.; Jonathan Dwight, Jr., of New York City; Casey A. Wood, Chicago, Ill.; George S. Guion, New Orleans, La., and R. M. Barnes, Lacon, Ill., all now deceased. My own first "find" in this field was pages from *The Hoosier Naturalist* (1887) pasted on a storage case in a workroom of the department of zoology of Indiana University. Brown, splattered, and unsalvageable though it was, it bore B. W. Evermann's list of "Birds of Monroe County, Indiana," a subject in which I was then largely absorbed, and was treasure trove. Of *The Pastime*, published at Washington, D. C. (1883-1885), I was fortunate in getting copies from the original publisher and from a sister of one of the editors to add to an incomplete set in the National Museum. Time has perhaps eliminated all such sources, but from persons more distantly connected with the sponsors, from libraries paying little attention to their ornithological possessions, or even from unsearched attics, who knows what rarities may yet be obtained? Surely of those that never passed the Volume I, Number 1, stage, there may be some as yet undiscovered. May all of them at length be resurrected and preserved to enshrine the memories of their once young and ardent creators!

French Mulberry

By HUGO H. SCHRODER

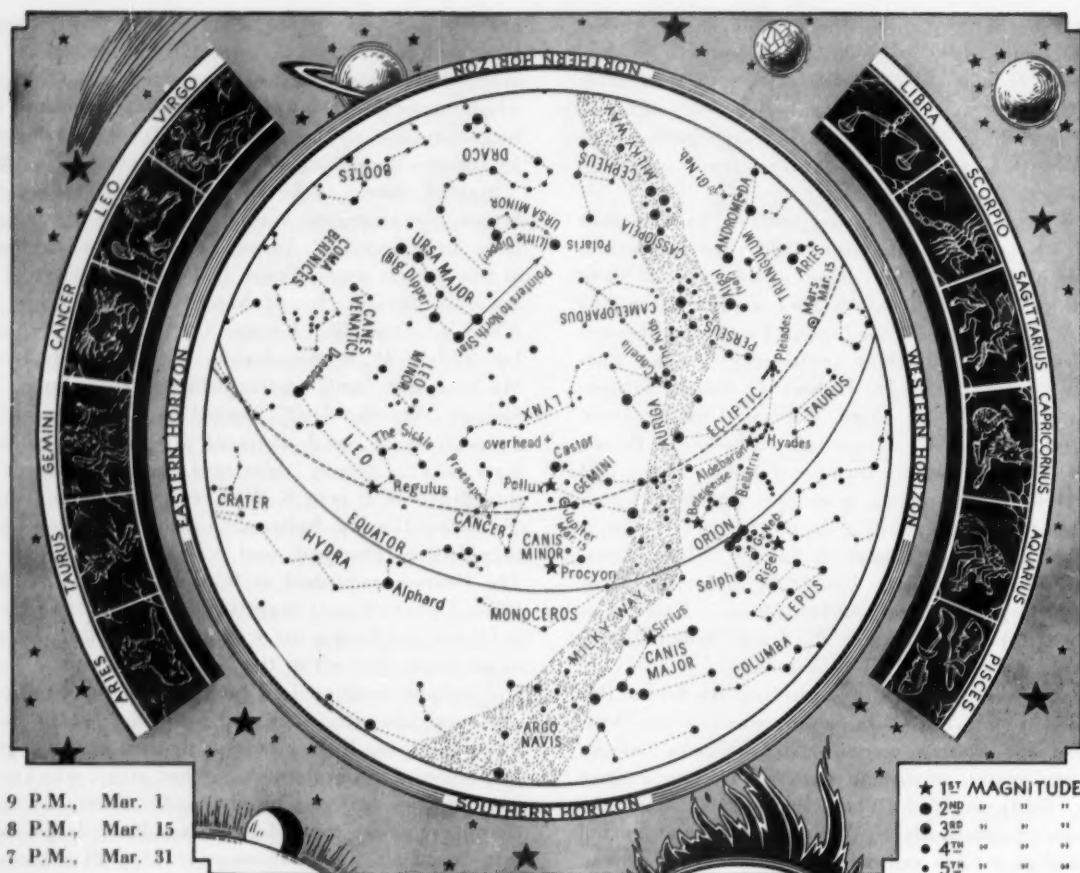
Photographs by the Author

THE shrub commonly known as French mulberry, *Callicarpa americana*, is not French, neither is it a mulberry. It belongs to the verbenaceae family. Sometimes it is called beauty-berry, which would be a much more suitable term as its generic name, derived from the Greek, means beauty and fruit. Its showy fruits are violet-red. The bloom is rather small, with clusters of berries following in autumn. Those are borne along the central stem and between each pair of opposite leaves.

This showy plant is found from Florida north to Maryland and westward to Texas and Oklahoma. In autumn it is a vividly colored plant. It grows in moist woods, thickets and bottom lands,



being found as far south as Mexico, the West Indies and Bermuda. It is widely cultivated and grows to a height of about ten feet, adding to its attractiveness.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

Meteors and Meteorites

By SIMONE DARO GOSSNER

ON NOVEMBER 30 of last year, a nine-pound meteorite fell near Birmingham, Alabama, doing some damage to the roof of a house, and bruising a housewife rather severely. The stone was quite probably a fragment from the bright meteor that exploded in the sky a few moments before, and could be seen from places in Georgia, Alabama and Mississippi.

Such an occurrence is bound to strike the imagination, but let us pause and consult some statistics before we run to the back yard and start digging a meteorite-shelter. Records show that, since the beginning of the sixteenth century, only fourteen cases have been reported in which a person or a domestic animal was hit by a meteorite. It may further be added that in none of these cases could it be established beyond doubt that the stone was of extra-

terrestrial origin. If the analysis proves that the Alabama stone is definitely of meteoric origin, this will be the first established case of a meteorite hitting a human being, and thereby lies its particular interest.

Otherwise, meteorites as such are quite common objects; an estimated 350,000 pelt the earth in each century, the majority of them of small size. Of these perhaps 25 per year fall over this country. Those falling on federal lands are the property of the United States Government, and the Smithsonian Institution owns an extensive and representative collection.

Meteorites can be classified generally into two major categories. There are the stony ones containing principally oxygen, iron, silicon and magnesium. And there are the metallic ones containing iron, nickel and cobalt. Less numerous specimens are found to exhibit a combination of both the stony and metallic

compositions.

The recovery of fallen meteorites can be a fascinating hobby, although the enthusiastic neophyte must be prepared for some disheartening setbacks. Expert scrutiny alone can determine, as a last resort, whether the collector's prized possession is anything else but a piece of scrap iron, or a bit of road tar. Best hunting grounds are the cultivated areas of the great plains, which are quite free of ordinary stones. The stony New England countryside, on the other hand, is unfavorable, unless the meteorites are actually seen falling.

Astronomers prize these finds highly because they constitute the only samples of extra-terrestrial material that reach the earth, and thus can be analyzed in the laboratory. Their composition gives us a hint as to the composition of the asteroids, those countless planet-like objects belonging to the solar system. Actually the data of observation indicate that the meteorites themselves are probably asteroids whose orbits eventually came close to that of the earth, as a result of the combined gravitational effect of Jupiter and Saturn.

As the meteorite enters our atmosphere, the ensuing friction generates an enormous amount of heat. This causes a fusion of the outer layers, and the object is often seen to explode in the sky with a noise resembling a thunderclap. The fragments are scattered over an area of several square miles, and the heavier pieces sometimes bury themselves several feet underground. As they strike the ground, the energy generated by the impact can be sufficient to produce an explosion, leaving a crater similar to those found in Arizona and some parts of Utah.

It is a common misconception to believe that every time one sees a shooting star, or meteor, a meteorite will inevitably fall on the earth. Quite to the contrary, the evidence points clearly to the fact that meteorites and the majority of shooting stars have a different origin. Whereas the meteorites are asteroid-like, about nine-tenths of the shooting stars, the so-called shower meteors, are associated with comets. These shower meteors are no bigger than a grain of sand and are completely dissipated by friction in the atmosphere.

Astronomers have not yet solved, to their complete satisfaction, the exact relationship between shower meteors and the comets with which they are associated. It is impossible, as yet, to say whether comets are formed from the dust that causes shooting stars, or whether this dust is the result of the disintegration of comets, but great strides have been made in the last few years and the solution may be near at hand.

Clouds of dust particles are distributed along the orbits of comets, sometimes even all along the orbit,

and sometimes in greater concentration at one point. In either case the dust travels around the orbit in a manner similar to that of the comet itself. As the earth intersects the orbit each year, a meteor shower may be expected at that time, because the earth's atmosphere "sweeps up" the dust. Meteor showers are spectacular when the concentration is greater at some point of the orbit, and in those years when

the earth intersects the orbit at that particular point.

The particles enter the earth's atmosphere with relative velocities ranging from 15 to 45 miles per second. The heat generated by the friction causes them to become luminous until they have completely disintegrated, producing the well-known phenomenon of the shooting star. This occurs at atmospheric heights averaging 75 miles for the beginning of the trail, and 50 miles for its ending. The

slow-moving ones become luminous at relatively lower altitudes than the faster ones. All the particles belonging to the same shower enter the atmosphere with essentially parallel motions, but the effect of perspective makes them appear to radiate from one point in the sky. That point is the "radiant" of the shower. It is the custom to designate a shower by reference to the constellation in which its radiant lies, although occasionally the name of the associated comet, or of a nearby star, is used.

A brief list of the major showers observable visually would include The Quadrantids, on the evening of January 3, with a normal rate at maximum of 30 to 40 meteors per hour visible to a single observer; The Lyrids, on April 21 and 22, with an approximate rate of one meteor for every five minutes; The Perseids, undoubtedly the most spectacular of the yearly showers, with a rate of about one per minute, best visible after midnight during the first two weeks in August; The Orionids, which may attain a rate of 20 per hour at maximum, on October 20 to 23, although they may be seen in reduced numbers for five days on either side of the maximum. They are associated with Halley's Comet; The Leonids on November 16, with a maximum rate of one every three minutes. They have the distinction of having produced one of the largest showers ever seen on the American continent. In 1833 the hourly rate was estimated in excess of 10,000. The show was repeated with some moderation in 1867 when the observed rate, hampered by the brightness of the moon, attained 1000 per hour; The Geminids, on December 13, with a normal rate at maximum of 40 per hour.

It should be noted that the rates indicated here apply only if the radiant is at the observer's zenith. They are considerably smaller if the altitude of the radiant is low.

Two other showers, (Continued on page 164)

The Comet

By DANIEL SMYTHE

Out of a point of cosmic dust,
Spiraled, disk-like, globular,
We turn to what the night has thrust
Upon a momentary star,

And peer, knowing velocities
Beyond our ken are breaking there.
We dare to know on earth and seas
What spins beyond our little air.

The School Page

By E. LAURENCE PALMER

Professor Emeritus of Nature and Science Education, Cornell University, and Director of Nature Education, The American Nature Association

TREE CLEANERS AND THE SCHOOL ROOM

DURING the years, thousands and thousands of children have been asked to express their interest in Nature by making drawings. Sometimes this is fatal to the interest, but many teachers persist in the idea. Usually drawing is of something that has a color and color pattern that, with little effort, may be represented on paper or blackboard. Few birds satisfy these requirements better than do redheaded woodpeckers, and so this species has appeared in school books, and in school exhibits, possibly as frequently as any other kind of bird. I have seen its picture in parts of the country where the redhead never lived. Similarly, I have seen teachers teach about chestnut burs, and the habitat of the Village Blacksmith, long after chestnut burs were no longer available to be seen and felt, and long after the blacksmith had become an automobile mechanic. It is only natural that teachers, burdened with obligations, should do what is easiest for them; turn to books and let the books make all of the suggestions.

I rather hope that the insert in this issue of *Nature Magazine* will suggest that, instead of studying books, children will be encouraged to make a few studies of micro niches, or little areas where conflicting problems come to grip with each other, and somehow or other work out a satisfactory solution. We all like trees, I am sure, and trees provide problems. Some of these problems are caused by insects, and some of the insect-caused problems are solved by the birds we here consider. Consider in your classroom how different it must be for a bird to remove an insect egg from the fine twigs of a tree, as contrasted with removing the larva of a wood-boring insect from deep in the wood. The charts of the insert should suggest species that assume the different responsibilities. If not, then make a few observations on what local birds glean a living from fine twigs, what species pick their lunches from the bark surface; what kinds probe into the bark crevices; what kinds probe deeply into the wood. Notice if any seem to use their beaks as levers to pry bark loose, and what kinds drill holes to meet their needs.

Another interesting activity might center around observing the type of holes drilled by the different kinds of woodpeckers. Collections might be made of pieces of bark that have been drilled by downy woodpeckers, sapsuckers, hairy woodpeckers, pileated woodpeckers, and so on. The study of holes might be extended by making notes on the size of openings and the depth of the burrows made by the different species. If a nesting hole is available for study, towards the end of the nesting season, it might be interesting to make some collections of the material to be found at the bottom of the holes, to discover if they shelter any bird parasites that might affect the comfort of the birds that had lived there.

Further studies might be made to answer varied questions. Which of the birds found gleaning a meal from the trunks of trees work from the bottom of the tree upwards? Which of the tree-trunk birds work with their heads up or with their heads down? Which of these birds use their tails to give them a firmer grip on their support, while they use their bills to do violent work? Which of the birds have three toes and which have four? Of those that have four, which have two toes pointing forwards and two backwards, and which have but one pointing backwards? Do any of them have but one toe pointing forwards? Which of the birds appear to be in equal abundance the year round, and how can this be accounted for in view of the fact that so many birds vary greatly in their abundance at different times of the year? Which of the birds are to be found on the ground, and why are these birds found there, while others are not?

Which of the birds may be found eating plant materials at any time?

Some good studies in geography may be made using the birds we have listed as a basis. On outline maps of North America indicate roughly where the different kinds may be found, using data provided in the second section of the chart material. Do the birds to be found in the eastern part of the country seem to have relatively large ranges, or do those of the western areas appear more widely distributed? Which of the birds listed have the most limited distribution? What, if any, conditions seems likely to affect the size of the range of any of these species of birds? Which, if any, of these seem to favor the warm tropical areas, and which favor the north country? Do any seem to extend their range north into the treeless part of the continent? Is this as you would expect it to be?

Using the data provided in the chart section of the insert, make a few bird houses suited to the needs of the birds here listed. Be sure to provide the appropriate opening, depth of interior and the needed room inside. Why is it best, in cases of this sort, to have the doorway or entrance near the top of the box instead of near the bottom, as is the case in the homes used by human beings, and by some kinds of birds? Be sure to finish your bird house project by putting the house up at a suitable time and place. Remember, too, that it may be best to build your bird house so that, when it is no longer used for the season, you may give it a thorough cleaning to get rid of possible bird parasites.

Establish a bird feeding station near where these birds are likely to be. Provide the station with such foods as suet, sunflower seeds, mixed grain, peanut butter and fruits like sliced apples. Do these birds show any preference for food that is animal matter, in contrast to food that comes from plants? Do any of the birds that visit your feeding stations make any effort to store food some place nearby, or is the food taken consumed on the spot? If your mixed grain includes such things as wheat, barley, corn, buckwheat and so on, do the birds show any particular preference for a particular food? Do birds of different kinds show the same preferences? Is there any time of day when the birds are most likely to visit your feeding station, or is it for the most part on an irregular schedule? Do the feeding station visitors seem to be more frightened and alert when they are at the station than when they are away from it?

The birds that have been considered here have a great variety of sounds that they produce. Can you recognize in these sounds any evidence that some mean fear, some a challenge, and some other emotions? In many of these birds it is relatively easy to distinguish the males from the females. Does there seem to be any evidence that the noisier sex is the male, or is it the female?

If you can get a copy of Ruth Crosby Noble's *The Nature of the Beast*, do not fail to read in it the chapter on sex recognition by flickers and by other animals. Not only will you laugh at what is written, but you may wish to see if you cannot get similar results by putting artificial moustaches on female flickers that have already established a home with the help of a male.

Make some lists, if possible, of the kinds of sounding boards that are accepted by the woodpeckers of your neighborhood. This may include the clapboarding on houses, metal rain fixtures, dead but sound tree branches, and so on. Are rotten, soggy branches commonly used for this purpose? If possible, learn to recognize the interrupted drumming characteristic of the sapsuckers.

Do you have any evidence that satisfies you that any of these birds adapt themselves to meet the demands of their living, or do you think they may adapt their mode of living to the nature of their bodies? In how many books and school outlines can you find this word adapt and adaptation used in a way that guarantees that the animal makes a conscious modification of its structure to fit a particular opportunity that may present itself? You may find that many persons holding important positions misuse this word, but how do you really feel about it?

Our next special insert will deal with cats. Do you think that anything should be done by you, for the birds considered in this insert, to protect them from the cats considered in the next insert, and, if so, what?

★★★★ Shopping Outdoors ★★★★★

Bluegills, crappie and surface-feeding game fishes are said surely to go for the new **Midget Hula Popper** announced by Fred Arbogast Co., 313 W. North Street, Akron 3, Ohio. It features a new, midget-size rubber Hula Skirt. The same manufacturer also announces its new "**Spin Liz**" Lure, a flashy new, spoon-type metal minnow in bright nickel or gold finish. Bass, crappie, trout and others are reported to love it. All details about both of these lures from the address given.

We have not seen this, but the **K-9 Guardian Collar** is said to rid a dog immediately of infestation by fleas, ticks or lice. **Paul Alexander Company**, 75 Madison Avenue, New York 16, N. Y., handle this. It is a hand-stitched dog collar of fine saddle leather, with a special patented lining to which **Formula K-9** ointment may be applied by fingertip and give the dog a new outlook on life. Sells for \$2.98 at pet stores or department stores, or direct.



Trips through the open country at the legal speed limit are usually accompanied by wind noise as you drive along. Listening to the car radio becomes hopeless, and the noise is a nuisance otherwise. Now comes **American Homecraft Co.**, Dept. N. M., 3714 N. Milwaukee Avenue, Chicago 41, Illinois, with its **Wind Silencer**. Made of strong, good-looking stainless steel, the silencers are simple to install on any car. A pair sells for \$2.98, postpaid and guaranteed.

Installing table tennis in your recreation room means taking up a lot of space, and means also a lot of nuisance when you want to take the table down for some reason. Now **Department NM, Sico Manufacturing Co.**, 6045 Pillsbury Ave. S., Minneapolis 19, Minnesota, have devised a table known as **Sico Model 2100**. It folds up and can be quietly rolled away on big rubber casters.

A new portable **Camp Stove** utilizing a disposable liquefied petroleum fuel tank has been developed and is now being marketed by **The Turner Brass Works**, Sycamore, Illinois. It weighs only six pounds and is compact, ideally suited for varied outdoor use. It can be put into operation in a matter of seconds, and goes to work immediately, even in sub-zero weather.

Imported from Germany is the **Mighty Mite Microscope** that should be interesting to those with a beginning interest in the tiny. **United Importing Co.**, 9043 S. Western Avenue, Chicago 20, Illinois, announces this instrument, which is pocket-size. At the price of \$3.95 postpaid it is something with which to start looking at little things and probing their secrets.

A **State Flower Game** has been added to the series of Nature Games available from the **National Wild Flower Preservation Society**, 3740 Oliver St., N. W., Washington 15, D. C. Thirty-five of the cards have State Flowers in full color; six cards have the names of States that share the same flower. Twenty-one of the cards picture other wild flowers. The game sells for \$1.25.

At the Museum

I See 'em at the Museum. By George L. Mountainlion. Tucson, Arizona. 1954. Arizona-Sonora Desert Museum. Illustrated by Mac Schweitzer. \$1.00.

George L. Mountainlion is a feline research associate in human behavior and resides at the Arizona-Sonora Desert Museum near Tucson. He writes a weekly column for the *Arizona Daily Star*. Arthur N. Pack, who is on intimate terms with George, once heard him rumble something that sounded very much like, "I'm going to write a book." This is the result, which appears to be a collaboration between Mr. Pack and George. In fact, in a preface, Mr. Pack describes himself as "Ghostwriter," but gives George full credit for the perspicacity, humor and pithy thought that appears in this collection of verses. This reviewer has met George personally and is convinced that he contributed largely, and was fortunate to have a collaborator so attuned to a mountain lion's inner thoughts. This amusing little book is sold at the museum, its profits going toward the maintenance of this unique natural history establishment, which is a "must" for every visitor to the Tucson area.

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Camera Trails

By

EDNA HOFFMAN EVANS

ONE thing that particularly used to bother me in the years that I did newspaper work, and which still irritates me as I read my daily paper, was and is the lack of follow-through in many stories. The reader (and frequently the reporter) never knows what finally happens to people who are temporarily in the news. Few stories are ever followed through to the end. On the other hand, few stories actually do end. People continue with their daily lives, things keep on happening to them, and time goes on. But, so far as the newspaper is concerned, when the daily routine is resumed, the bright spotlight of publicity is turned elsewhere.

I often wondered, as a cub reporter, what happened to the people I interviewed and wrote about. But there was never much time to look them up again because the news editor was always sending me out on newer, fresher trails. So the stories rolled out of my typewriter and the people I wrote about flowed by like leaves in the current of a swift-moving stream. They came into focus briefly while they were passing my particular spot on the bank, and then they disappeared from sight again. That heretoday-and-gone-tomorrow aspect of newspaper work was one I did not like, and it is one of several reasons why I am no longer a member of the so-called "working press."

Yet even with "Camera Trails," where I try to keep things in focus longer, I find that time passes swiftly and subjects come and go. For example, it was just a year ago when I last wrote about picture-taking by remote control. It was a subject that appealed to a great many readers, judging from the response I have had from them.

There is a tremendous fascination in the thought of taking a shy animal's picture from a great distance—or, better still, having that animal take its own picture when the photographer is nowhere around. It seems like a simple act to pull a string, or to have some animal take the bait and trip the shutter. But before and after that simple act is accomplished comes a vast area of photographic know-how and ingenuity.

In the March, 1954, "Camera Trails" section I reproduced a letter from Mr. Joseph G. Hall of Berkeley, California, together with diagrams showing the electrical operation of a flash trap he had designed. Since Mr. Hall is doing gradu-



This doe-and-fawns picture was taken with the high speed flash-trap device designed by Mr. Joseph G. Hall of Berkeley, California.

ate work at the Museum of Vertebrate Zoology, University of California, he does not have too much time to devote to his photographic interests. However, in the months that have passed since our first round of correspondence, he has obtained some results that are gratifying, as well as some that are not.

I hope that readers who are interested in the technical set-up will refer to last year's section that gave a detailed description of the operation of the flash-trap. Here comes the more recent follow-through.

Last April, during a camping trip in Arizona, Mr. Hall set up his flash-trap in the vicinity of the Arizona-Sonora Desert Museum near Tucson, and also on Mount Lemmon, a wooded peak that towers over its fellows in the same area.

On that trip, Mr. Hall reported: "The

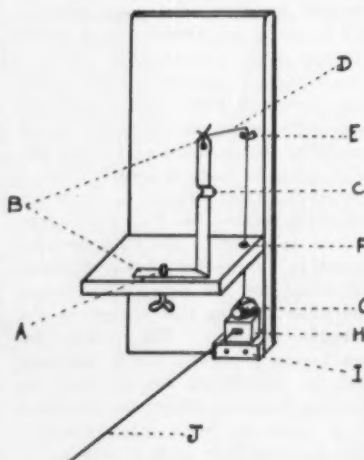
flash was set off three times. Due to a failure of the synchronizing mechanism, however, I got no photos. Very disappointing, but that is SOP (Standard Operating Procedure) in this game.

"By the end of May I had finished constructing the high speed flash unit, which I hoped would be suitable for flash-trap use. Since then I have had several chances to try it out and inclose one of the shots taken with it." The picture he sent was the one of the doe and fawns.

Deer, with or without fawns, are not exactly ordinary subjects and not every photographer has the opportunity to take pictures of them. However, as a later letter from Mr. Hall pointed out, one need not go into the real wilds in search of subjects. But let him tell the story:

"As you well know," Mr. Hall wrote, "it is not at all necessary to go far afield to get results, and I inclose a shot obtained a few weeks ago in the garden of a friend of mine here in the Berkeley hills. A 'coon had taken to usurping the cat food this family was in the habit of leaving out every night. In fact, several times one raccoon parent accompanied by a troop of youngsters appeared. So I set up the trap and during the night had the recorded visitor.

"The setting is not very 'wild' but it is authentic and is an example of what might be found in almost any suburban garden. The trip thread runs from the stick on the left side of the photo to the mercury switch mounted on the stake just to the left of the flower pot. Looking closely, one can see part of the thread running under the left paw of the 'coon, over its left knee to the 'trigger' which has been pulled out and is seen in midair as a small whitish blur near the last black stripe of the 'coon's tail.



"The Thing," a device designed by Mr. Charles E. Gage of Falls Church, Va., to trip push-in shutter release buttons by remote control.



This raccoon picture, also made by Mr. Hall's high speed flash-trap device, shows the photographic possibilities to be found in suburban gardens. Notice the "bait," the two stakes, and the blur of the trigger as it passes the 'coon's tail.

"Like the doe-and-fawns shot, this picture was made using my high speed flash arrangement which was placed about ten feet from the subject. The shutter was set at 1/50th second (really a meaningless factor due to the very high speed of the flash) with an aperture of f/11, using Ansco Isopan 3 1/4 x 4 1/4 cut film in a Crown Graphic camera."

The photographic results speak for themselves.

Mr. Hall is quite right, too, about the photographic opportunities to be found in suburban gardens. He refers specifically to California. And here, across the continent in my parents' garden in Florida, a young 'possum recently took up residence only to fall prey to some neighbor's cat before I got here to photograph him. And right now, while I have been typing this section, a pert Florida gray squirrel has been sampling the bumper crop of avacados piled outside my window. Shooed away briefly, he is now sitting on the lowest branch of a grapefruit tree scolding at me. My camera, of course, is out of reach and I am sure the saucy fellow knows it.

To return to this matter of follow-through. Another item of long-left-unfinished business on the agenda is the problem of a remote control shutter releasing device for cameras with push-in buttons like the one on my Exakta. Not long after I noted my puzzlement concerning this situation came a letter from Mr. Charles E. Gage of Falls Church, Virginia, together with photographs and shortly thereafter "The Thing" itself.

"The Thing" as Mr. Gage named it, is a neat and workable device whereby push-in shutter releases can be operated from a distance. To describe the device in Mr. Gage's own words, "The Thing can be tacked up almost anywhere, against a post or a tree, or inside a packing

box for shelter. Its operation is simple. An animal tries to steal the bait; this act pulls the string; the string jerks a small block of wood from under a chunk of lead; the lead drops; this jerks the string attached circuitously to the aluminum strip and the offset place in the aluminum strip strikes the shutter release. Result: Picture!"

To be more specific, "The Thing" is first of all two boards, the vertical one longer than the horizontal one. They are attached to each other at right angles, the joining point being about two-thirds of the distance from the top of the longer board.

Alphabetically speaking, in reference to the diagram, "A" is a wingbolt which holds both camera and aluminum strip "B" which is twisted into an L-shape with a fancy turn that keeps its flat surfaces in the right places. At point "C" the strip is bent into an offset measured accurately to strike the release button of the camera. "D" is a strong and non-stretchy string running from its point of attachment at the top of the aluminum strip, straight back to a screw-eye "E" in the base board, and then straight down through a hole "F" in the horizontal board, below which it is tied to a lead weight "G." When "The Thing" is set, the weight rests on a small block "H", which in turn rests on a similar sized block "I" that is nailed securely to the back board. Tied to block "H" is a string "J" which can be pulled by the camera operator, or by the subject itself, and when the block is yanked out the lead weight pulls the aluminum strip so the offset hits the shutter release.

Like all devices of this nature, "The Thing" must be set up with care so that the offset in the aluminum strip strikes the camera release button at the proper

(Continued on page 164)

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THE OYSTER'S MESSMATE

(Continued from page 127)

unless the customer is aware of the crab's value in enhancing the soup. Such stories, fortunately, have little effect on the small, but growing band of gourmets that prize oyster crabs for their sweet, delicate flavor in special oyster-crab soup, or mixed with an oyster stew, or eaten raw. This curious marine creature continues to command a premium price as a delicacy but, of course, they are not abundant enough for extensive commercial use.

The oyster crab as a messmate has undoubtedly been the subject of comment since the beginning of history. Bashford Dean, the great bibliographer of fishes, remarked that Pliny quaintly spoke of it as a discreet doorkeeper, who, in return for safe quarters, pinches the oyster, warning it to close its shell in time of need. Plutarch, on the other hand, as if unwilling to be outdone by his voluminous rival, ascribes the association to motives of partnership, the crab contributing its eyesight, and the oyster its entrapping shell. In our day and age, its quasi-parasitic nature, its gastronomic value to man, and its remarkable life history, cannot help but excite everyone's curiosity. One thing is sure, the scientist and layman alike will find his crab far from being a boring or tasteless subject.

From Our Readers

Members of the American Nature Association and readers of *Nature Magazine* are ever alert, and send us many clippings. One reader clipped a travel story from a New York newspaper. This carried the heading "Everglades Hunting Is Miami Fad," and in the story is a paragraph about wild boar hunting in the Everglades. Our reader noted on the clipping: "I did not know that hunting was allowed in our National Parks!" Of course, reference to the Everglades is not synonymous with Everglades National Park, which does not include all the area classed as Everglades by a long shot. Hunting is not, of course, permitted within the boundaries of the Park, but those Everglades outside the park are under State jurisdiction.

Another reader sends us a four-column advertisement from the *Knoxville Journal*; a quite repulsive advertisement, too. It shows three gunners, holding four dogs and kneeling before an automobile draped with the bodies of twenty dead raccoons. The text boasts about the results of six nights of 'coon hunting and the prowess of the dogs, which are "not for sale at any price." The advertisement finally testifies that the cost of the space is made possible by purchases at Cas Walker Super Markets. This is the strangest advertising we have ever seen, and certainly a sad commentary on American good taste.



Blue Birds Eileen Thomas and Carol Yoshida, future Camp Fire Girls, discuss conservation with Smokey Bear.

Camp Fire Girls

Nature and conservation activities loom large in the Camp Fire Girls program, which has as one of its major objectives "to increase appreciation of nature, and skill in out-of-door living." This aim was furthered recently through one of the organization's national projects entitled "Down To Earth." From coast to coast Camp Fire Girls followed this theme to discover the importance of the soil to the health, wealth and happiness of all peoples.

In Omak, Washington, a Camp Fire group studied at first-hand the life-cycle of a tree from seed to lumber product as part of its "Down To Earth" program. The girls toured a logging camp in a near-by pine forest—then followed the logs to the mill, where they watched them made into timbers and boards. As a final step members of the group visited a factory where the same boards were turned into finished lumber and wood products to be shipped to nation-wide markets.

The necessity of conservation to daily living was brought home to Lawton, Oklahoma, Camp Fire Girls through a "Down To Earth" project in which they explored the course of water from cloud to kitchen tap. Members made trips to a watershed and filtration plant where, eye-opening charts on their community's hourly water consumption were obtained.

Because of Camp Fire's interest in conservation the park department in Lawton turned over to the organization an undeveloped park, which they planted and tended under the supervision of a local women's club.

Camp Fire Girls in the Redwood Empire area of California received three-fold gains from their "Operation Corn," undertaken in connection with "Down To Earth" activities. Members planted (in not-quite straight rows, they admit) and cared for (despite trespassing sheep) a small patch of Indian corn and gourds to be sold at their annual county fair—

thereby learning practical farming knowledge, earning several craft honors and raising funds for national dues.

An outgrowth of the "Down To Earth" national project was a decision by Great Falls, Montana, Camp Fire Girls to assist in the improvement of their own particular surroundings. In one neighborhood girls helped to develop a community picnic ground, while other groups planted flowers around churches and schools, built rock gardens, etc.

A Camp Fire group in Maryland (earning Torch Bearer's Camp Craft honors) practiced conservation by scarification, one of the many ways used at Cedarville experimental forest in that State.

And members of the youth organization throughout the land have helped in "Keep States Green" campaigns, rubbish collector distributions, camp and city beautification drives, etc. "Back to Nature" has become one of their everyday tenets.

Wildlife Conference

"Natural Resources Use—A Continental Challenge" is the theme of the Twentieth North American Wildlife Conference, which will hold its three-day session at the Sheraton-Mount Royal Hotel in Montreal, beginning March 14. All of the sessions are open to the public, including a special showing of outstanding wildlife movies by the Outdoor Writers Association of America on Sunday evening, March 13. March 11 to 13 the National Wildlife Federation will hold its annual meeting, with the Canadian Federal-Provincial wildlife agencies meeting March 10 and 11.

Conservation Caravan

Dates have been set for the travels of the Seventh Annual Conservation Caravan under the sponsorship of the Conservation Forum of New York State and the Buffalo Museum of Science. These dates are August 20 to 27, 1955. The all-expense fee for the trip is eighty dollars. This annual conservation trip is under the direction of Miss Mabel H. James, Holland, New York, and full details are available from her. The 1955 route will be all within the borders of New York State, except for one foray into Massachusetts to famed Bartholomew's Cobble.

Parks Board

Carl I. Wheat, lawyer and resident of Menlo Park, California, and Dr. E. Raymond Hall, chairman of the Department of Zoology at the University of Kansas, have been named to the National Parks Advisory Board. They succeed Dr. Harold E. Anthony and Dr. Theodore C. Blegen, whose terms expired.

Ways of the Ant

Ways of the Ant. By John Crompton. Boston. 1954. Houghton Mifflin Company. 242 pages. Illustrated. \$3.50.

Lives of the social insects have always had a special fascination, even among people not specially interested in Nature. The ants, among these insects, seems to command particular attention, and they attracted the interest of the writer of this book with happy results. He tells in prose that demands and holds the attention the story of the "civilization" found among the ants that go to war, indulge in slavery, are accomplished farmers and are even victims of drug addiction. This is popular natural history that draws in part on the author's own study of insects and in part upon the considerable published literature on the ways of the ant.

Bird Sidelights

Stray Feathers from a Bird Man's Desk. By Austin L. Rand. New York. 1955. Doubleday and Company. 224 pages. \$3.75.

Austin Rand is curator of birds at the Chicago Natural History Museum and has traveled widely throughout the world. In the course of his travels he has gathered many ornithological items and experiences, many of them surprising. To his desk, also, have gravitated more such data. All of this sort of thing provided eligible material for this interesting book, which gathers, as the title says, stray feathers from here and there. One need not be a bird student to find pleasure in reading this book.

Nature Studies

Studies in Nature. By Gold Collins Geake. Cincinnati, Ohio. 1955. The Botanic Publishing Company. 82 pages. Illustrated by Leona Ley. \$2.00.

In this spiral-bound book are presented a group of Nature studies, in large measure originated and conducted in the author's own yard or garden. Long active in Girl Scout work, Mrs. Geake dedicates the book to the girls in the Girl Scout Council of Fort Wayne and Allen County, Indiana. Many of the studies should serve as inspiration to Girl Scouts and other youngsters to repeat them in their own home surroundings.

Mrs. Martini's Family

My Zoo Family. By Helen Martini. New York. 1955. Harper and Brothers. 295 pages. Illustrated. \$3.95.

Anyone who has seen Helen Martini with some of her animal friends at the New York Zoological Park knows what a deep understanding exists between them. A tiny person, she is sometimes dwarfed by her charges, and one's tendency is to doubt for her safety. It all started when her husband, head keeper of the zoo's lion house, entrusted a new-

born lion to his wife to save its life. This led to other foster-parent duties and grew into a career. In this book is the story of her experiences and associations with a wide variety of individuals in the zoo's population. Beyond that, there are many revealing facts about animal psychology. Mrs. Martini writes informally and entertainingly in what turns out to be a fascinating book.

World's Waterfowl

The Waterfowl of the World. (Volume One) by Jean Delacour. London. 1954. Country Life, Lt. 284 pages. Illustrated by Peter Scott. Sixteen plates in color and thirty-three distribution maps. Five Guineas net.

This is the first of a projected three volumes. These, together, seek to "provide a synthesis of all that is known of the waterfowl of the world as they exist at the present time." This first volume deals with the magpie goose; the whistling ducks, swans, geese and brents; and the cormorants, sheldgeese, shelducks, and South American crested ducks and steamer ducks. Both author and illustrator are world-famed ornithological authorities who have studied these birds extensively in the wild.

California Mammals

Mammals of California and Its Coastal Waters. By Lloyd Glenn Ingles. Stanford, California. 1954. Stanford University Press. 396 pages. Illustrated. \$6.00.

This is a new edition of *Mammals of California* by the same author, first published in 1947 and immensely popular and widely used. This new edition has been reset, revised and broadened as to title. Drawings have replaced text keys. The author is professor of zoology and head of the life science division at Fresno State College, California. Excellent pictures by the author, who is an accomplished wildlife photographer, add greatly to the book, and the new pictorial key drawings are done by H. Wayne Trimm of the New York State Conservation Department.

African Frontier

Tales of the African Frontier. By J. A. Hunter and Daniel P. Mannix. New York. 1954. Harper and Brothers. 308 pages. \$4.00.

This is the story of a frontier and of its penetration; it is the story of Africa, which has changed from savagery to civilization within the lifetime of author Hunter. When the first settlers came to Africa, the area of Kenya was virtually unexplored, remote. In this fascinating book we find the record of what followed; the record of people and of pioneers. Important as history, this book is also the kind of reading that it is difficult to set aside.

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CAMERA TRAILS

(Continued from page 161)

place. Also, the angle from which the plug is jerked makes a slight difference in the way the lead drops, but a good sharp yank will do the trick. It can be used with or without synchronized flash. While "The Thing" is not as elaborate a set-up as the one designed by Mr. Hall, it does work. Many thanks, Mr. Gage in Falls Church, Virginia.

WATER HOLE SHOTS For readers who like to see the results of flash photography from a blind, I heartily recommend the September, 1954, issue of *Arizona Highways* magazine (published by the Arizona Highway Department in Phoenix—thirty-five cents per copy). In it is a beautifully illustrated article by photographer Lewis Wayne Walker called "Around the Clock at a Water Hole." The pictures were taken near the Arizona-Sonora Desert Museum and they record the bird and animal visitors in black-and-white and color. The article also gives interesting how-to-do-it information.

METEORS AND METEORITES

(Continued from page 157)

otherwise inconspicuous, have at some time produced displays comparable to that of the 1833 Leonids. In 1872 the Bielids, associated with Biela's Comet, produced a shower of 5000 to 10,000 per hour, and gave a repeat performance of the same magnitude in 1885. The Giacobinids, named for the comet Giacobini-Zinner, gave the largest shower of the twentieth century on October 9, 1933, with an estimated 20,000 meteors per hour. It was seen again in 1946, but the full moon dimmed out the fainter ones and only about 1000 per hour were observed.

The earliest known photograph of a meteor was taken at Prague in 1885. The systematic observation of meteors by photographic means is, however, comparatively recent. Photographic surveys from two coordinated stations have been conducted by the Harvard Observatory in the last twenty years. Their purpose is to determine heights, velocities and rate of deceleration of meteors. In the past few years, the use of radar has also been introduced in this field, both here and abroad. Radar observations have the added advantage that they can be made in daylight, and thus many daytime showers have been observed. These would otherwise have remained undetected.

In the month of March, the spring equinox will occur on March 21 at 4:36 A.M., Eastern Standard Time, at which time the sun will cross the equator on its northbound journey.

The Moon will be full on March 8 at 10:41 A.M., EST, and the New Moon will occur on March 23 at 10:42 P.M., EST.

Mercury will be at its greatest western elongation on March 11, and will appear in the east as a morning star, just above the horizon shortly before sunrise through most of the month.

Venus will be visible in the eastern sky in the early morning, being about 20° above the horizon at sunrise. Except for the Moon, it will be the brightest object in the sky.

Mars is in Aries and may be seen in the west in the early evening, setting at about 10:00 P.M. on March 15.

Jupiter is in Gemini, approximately 20° from the zenith at 8 P.M. on March 15, and setting at about 3 A.M. on that date.

Saturn, in Libra, will rise around 11 P.M. on March 15, and will still be above the horizon at sunrise.

Our astronomy article in this issue introduces our new astronomy editor, Simone Daro Gossner, an associate of Mrs. Isabel M. Lewis before Mrs. Lewis retired from the U. S. Naval Observatory. Mrs. Gossner is a native of Belgium, graduating magna cum laude from the University of Brussels in 1941, majoring in astronomy. Under grant, she studied for one year at the Harvard Observatory, continuing there a second year to obtain her A.M. in astronomy. She then taught at Radcliffe and served as a research assistant at Harvard University. She moved to Washington, D. C., when her husband joined the staff of the Naval Observatory, and in December, 1950, also joined the staff there.

Wampler Trail Trips

Dates have been set for the 1955 trail trips organized under the direction of Dr. Joseph C. Wampler, archeologist and mountaineer, 1511 Shattuck Avenue, Berkeley 9, California. One group of trips is known as "The John Muir Trail Trips," and these are in their sixth season. They are of varying lengths, the first trip starting July 9. The other trips are to Havasu Canyon, with six-day spring trips at intervals from March 27 to May 8, and, in the fall, from September 18 to October 23. Full details of these programs are available from Dr. Wampler.

State Problems

Word from Washington State is that two important issues before the State Legislature call for the support of conservationists. Senate Bill #17 has been introduced by Senators Patrick D. Sutherland and Eugene D. Ivy, providing protection for the mourning dove and removing it from the game list. House Bill #38 has been introduced by Representatives Eva Anderson, Elmer Huhta and Andy Hess, and would prohibit an open season on mountain goats in the

State. The goats were completely protected from 1925 to 1948, when a limited season was declared for no good reason.

In Nebraska there is a move on foot to return the mourning dove to the game list, from which it was removed by the previous Legislature. Conservationists are urged to let their representatives in the State legislative bodies know where they stand on these and other conservation issues.

Nature Camp

The Second Annual Nature Camp of Chicago Teachers College, held in cooperation with the Forest Reserve District of Cook County, will be run this year from June 27 to August 19. Tuition is free to Illinois students, and other costs are nominal. Full information may be obtained from Chicago Teachers College, 6800 Stewart Ave., Chicago 21, Illinois.

Cranes Fewer

When the whooping cranes returned to their wintering grounds on the Aransas National Wildlife Refuge in Texas there were only twenty-one of the birds. That is three less than a year ago, and there were no young of the 1954 year. This is the first time that no offspring have arrived on the refuge with the flock on its return from the far north. According to a Fish and Wildlife Service release: "Despite Federal efforts to save the unique cranes from extinction, natural losses and the gunfire of careless or malicious hunters have held down the growth of the flock."

Zoorama

"Zoorama" is the title of a brand new television program that made its debut January 9, over KFBM-TV, San Diego. It originates at the San Diego Zoological Garden and runs from 1:00 to 1:30 p.m., Pacific Time, its coverage being for southern California. It is understood that this feature is being considered for either regional or national network programming by CBS Television. "Zoo Parade" from Chicago is firmly established in the affections of an army of viewers, who no doubt would welcome another similar program.

Under the Sea

Aspects of Deep Sea Biology. By N. B. Marshall. New York. 1954. Philosophical Library. Illustrated in color and black and white by Olga Marshall. \$10.00.

Deep sea biology as a science is not old, really dating from the explorations of the H.M.S. *Challenger* from 1872 to 1876. But it is a field of biology rapidly becoming an important part of oceanography. In presenting his text the author appeals both to the biologist and to the intelligent layman.

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UNDER THE MICROSCOPE

By JULIAN D. CORRINGTON

MICROSCOPE IS LATEST WEIGHING DEVICE

THE number of kinds of microscopes and the uses to which they are put increases each year. Newest variation on the king of instruments is the Dyson Interferometer Microscope, manufactured by Cooke Troughton & Simms, Ltd., of York, England. Unlike the recently publicized phase-contrast instrument, the Cooke Dyson microscope employs two wedge plates that are manipulated by the operator by means of micrometer screws. As the bottom interferometer plate is moved, using white light as the illuminant, the background colors and also the colors on the object change through the spectrum, the phase is gradually shifted, and each change in color denotes a change in optical path. One wavefront of light does not traverse the object and is uniform, the other is deformed in passing through the object, and the two interfere. Disturbances in the second wavefront are measured precisely with reference to the first wavefront.

Differences in optical paths indicate differing densities. Measurements to 1/10th of a wavelength can be made by eye, and to 1/200th wavelength by photometric methods. This means that the mass of the material traversed by the second wavefront may be calculated by using a formula, the computations being in grams per square centimeter. Changes in weight of so infinitesimal an amount as 0.0000015 g can be measured. A specific calculation determined that the dry mass of a fibroblast nucleus, exclusive of nucleoli, was 91×10^{-12} g.

Using monochromatic light, a continuously variable phase-contrast system for qualitative work is provided, without the halo usual to this form of observation. Either color contrast or intensity contrast may be used, as desired. Those interested in further details of this remarkable new instrument should write to the American agents, the R. Y. Ferner Co., Inc., 110 Pleasant St., Malden 48, Mass.

METEOROLOGICAL OPTICS

6. Fata Morgana

IN THOSE examples of mirage thus far discussed the effects have been due to the bending of light rays in arcs, owing to continuous changes in density of strata of the atmosphere. In the commoner cases, the densest layers of air that should be closest to the ground are somewhat

above this level, warm air lying along the surface of the land or sea. Some of the light rays coming from an object to the eye of the observer pass directly through the colder, denser air and yield normal visual images; others, approaching the ground through the warmer, less dense strata are bent successively so as to be bowed upward, never reaching the earth, but giving the observer the impression of coming from below the ground level. He thus has a virtual image of the object and its surrounding sky, lying below the horizon, and appearing as inverted in a lake or pool of water (the sky). These lower light rays are concave upward.

There are also the somewhat less frequent events of a stratum of warm air some distance above ground or sea level, where the air is colder and denser. Rays of light coming from a distant ship, and thus nearly horizontal, will yield normal views of the vessel, but those passing from the ship to higher strata will be bowed downward through successively denser layers of air and give the observer a projected virtual image of an inverted ship on some cloud high in the air. The actual object may be over the horizon and invisible by direct rays, yet appear by virtue of this mirage. The upper rays of light are concave downward.

In the Strait of Messina, between Italy and Sicily, special and peculiar conditions in the atmosphere are of frequent occurrence, the two situations described above existing simultaneously. A stratum of maximum density will have decreasingly dense air, both above and below, forming a system that acts like a lens. Things seen through this meteorological lens appear magnified in a vertical direction, the effects being varied and weird. Commonly objects located on the opposite shore seem enormously tall; sometimes the images are multiple, one on the surface of the sea, others on clouds or hanging in the air as if on some aerial screen. One image may be erect and another inverted.

The Italian name, *fata morgana*, was given by the superstitious, who believed these startling apparitions were produced by the famous necromancer, *Fata Morgana*, known in Old French literature as *Morgain la fée*, or the English Morgan the Fay or fairy, legendary sister of King Arthur and most celebrated pupil of Merlin. This lady, of equivocal fame, has recently been reintroduced to the American CinemaScope audience in a big way, owing to the sudden rash of Arthurian films.

7. Looming

SOMETIMES atmospheric conditions are such that a lenticular stratification of density exists both vertically and horizontally. Objects seen through such a mass of air, a gigantic, two-dimensional lens, will be magnified both in height and breadth, producing truly alarming effects. Foggy, misty weather, particularly over cold oceans, as the North Atlantic, where the sun has heated the upper air

and the sea has chilled the lower air, then the whole is underlain by warm air coming in from some nearby region of changed weather, are some of the physical factors essential to produce this rarest and most wonderful of all mirages. The refraction of light rays passing from an object through this air mass to an observer is such as to provide the phenomenon known as *looming*, the object appearing closer, distorted, and magnified many times.

The effect may present such an aspect of reality that a sailor on watch may be badly frightened at seeing a buoy suddenly loom at a towering height close by, seemingly endangering the ship, whereas the actual buoy is normal in size and safely distant. This mirage is unquestionably responsible for the celebrated legend of the ghost ship, the *Flying Dutchman*, which even achieved grand opera in Wagner's *Der Fliegende Holländer*.

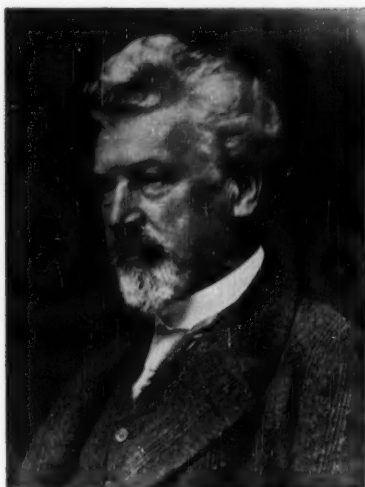
Most famous of land examples is the "Spectre of the Brocken," so named from having first been observed on the Brocken in 1780. An enormously magnified image of the observer is projected upon a cloud bank in mountain regions when the sun is low. This image, often misty and accompanied by halos, reproduces every movement of the observer and is a sight certain to startle those to whom the experience is new.

The Brocken, popularly the Blocksberg, is a mountain in Prussian Saxony, the highest point (3733 ft.) in the Harz Mountains. As the home of witches and goblins, the Brocken has figured in the folklore of North Germany from early times, and even centuries after the adoption of Christianity the traditional pagan rites continued to be enacted there every year on Walpurgis night, the eve of the first of May. In literature, the assembling of witches for an orgy on this occasion is depicted in the famous "Brocken scene" in Goethe's *Faust*, and in opera in the versions of both Gounod and Boito. Possibly the optical phenomenon was observed long before 1780 and had something to do with the creation of the legend.

THE MICROSCOPE MAKERS

XII—Ernst Leitz, Der Vater

THE birthplace of the senior Ernst Leitz, who developed a small local business into a great world industry, was the village of Sulzburg, in Baden, near the Swiss border of Germany. The family traces back to a burgher of Pforzheim, one Peter Michael Leitz, in 1622. Two generations were tailors, the grandfather of Ernst was a goldsmith, and the father a teacher. Such was the background of Ernst Leitz, born on April 26, 1843, son of Ernst Albert Leitz and Christina Elisabeth Doebelin. His upbringing was careful, high-principled, and religious, his father wishing him to enter the ministry. However, young Ernst had a pronounced practical talent and wanted



Ernst Leitz, 1843-1920.

to become a mechanic, so the father yielded and sent him back to Pforzheim to live with an uncle and to apprentice under Christian Oechsle, manufacturer of physical and chemical apparatus and industrial machinery. Here the lad found much to learn and experienced personnel to instruct him, and here was laid down a scientific and mechanical background that was to shape his future. At the same time he noted the dangers inherent in a business with too many interests and no specialties. He decided to make for a definite goal.

Upon completing his apprenticeship he traveled, and for a time in 1863 worked with Mathias Hipp at Neuchatel, famous for his electric clocks and telegraph instruments. Here he observed mass-production methods of the world-renowned Swiss precision watches, and was entrusted with procedures that were later to play an important role in his own career. It was here, too, that he associated with a number of other young mechanics, and met Karl Junker, who had been employed at the Kellner Optical Institute in Wetzlar. The picture of opportunity painted by Junker was such that in December of 1863 Leitz left Switzerland for Wetzlar and went to work for Friedrich Belthle, as detailed in our preceding installment.

In the fifteen years since Carl Kellner had founded his company there had been little change. The enterprise was carried on in the home, a single room accommodating the several workmen. The yearly output was some seventy microscopes and there was always the fear that sales would decline. Very different indeed had been the long range and large scale of the setup of Mathias Hipp. Young Leitz lived in Belthle's home and soon, in 1865, at the age of 22, he was made a partner in the firm. But the business steadily deteriorated, owing to Belthle's illness and lack of contacts with the scientific world. The confidence of Leitz in the future was often badly shaken,

but at this critical time he met, loved, and wed Anna Löhr. This turned out to be a most fortunate match, as Anna made him a hard-working and economical helpmeet with a fine outlook on life. When things were low she often secretly put money in his coat pocket, and for a while worked with him in the shop.

After the death of Belthle in 1869, Leitz took over the business and was immediately faced with the double difficulty of debt and the Franco-Prussian War. After 1871 there was a change for the better, the young company taking part in a general upswing. Competition with the favored Paris microscopes disappeared, while the German firm of Oberhauser was driven from Paris and never recovered its prestige. Now arose a pressing demand for good German microscopes and a large field was opened for Leitz.

In 1870 Leitz issued his first price list. In contrast to other optical organizations, Leitz, not yet 30 years old, with his Swiss business training, could offer unheard-of bargains, and the way was paved for dealings with the great universities. He proceeded to make these connections by means of personal visits and demonstrations, and soon the firm had left forever behind the days of poverty and fears for the future. Chief among causes for the new prosperity were the personal abilities of Leitz, better technical methods, and great increase in demand for microscopes from all divisions of biology and medicine.

The Wetzlar works had not kept pace with Hartnack in either the optics or stand, and Leitz made it his business to remedy this condition. He introduced a water-immersion objective and increased the magnification of the high-dry, at the same time improving the stand. He brought out oil-immersion objectives of 1/12, 1/15, and 1/18 and discovered a new line of customers in the mineralogists. Following the epochal work of Ehrenberg and Zirkel, mineralogists clamored for suitable instruments, and Leitz designed a special stand for their use in 1885, incorporating polarizing apparatus, and issued a special catalog in this field in 1893.

While through the years 1849-1860 the Kellner workshop turned out about 400 microscopes, the next decade saw 600 produced and between 1870 and 1880 the number reached 2500. Of all the microscope makers then operating, Leitz and Zeiss now took the lead. There was Hartnack at Potsdam; Gundlach, a graduate of the Kellner shop, in Charlottenburg, who turned out a glycerin-immersion objective in 1867; the brothers Wilhelm and Heinrich Seibert in Wetzlar, also products of Kellner's training; R. Winkel in Göttingen, known for an excellent objective; and C. Reichert, brother-in-law of Leitz who, after a few years at Wetzlar, located his shop in Vienna. Only the firm of Carl Zeiss in Jena which, in 1866, acquired the services

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of Ernst Abbe (ah-bay), could claim greater accomplishments in microscope design.

Prosperity meant many changes in size and location of the shop. In 1870 Leitz moved into the house of master-smith Grell, and employed at that time 7 opticians, 10 mechanics, 1 cabinet-maker, and 2 apprentices;—a form of establishment that seems incredible to moderns. Moving to another combination dwelling-shop in 1875, Leitz had to erect an adjoining building in 1880 to house the works and this became the first separate factory of the firm. It was a small, two-story affair, with the mechanics on the ground floor and the opticians on the second floor. Three years later the first large plant was erected. In 1885 a still larger mechanical workshop was constructed and in 1888 a similar new optical shop, so that by this time the establishment was really sizable. Steam was first employed in 1883 and a steam turbine to produce electricity in 1893.

Keeping pace with physical changes, the number of employees passed the hundred mark in 1887, and reached 200 only two years later. In 1887 the 10,-000th microscope left the plant, four years later the 20,000th, and in 1899 the 50,000th.

Until 1880 Ernst Leitz, who was equally at home in all branches of the business, managed the workshops alone save for help in bookkeeping from his wife. But now the mechanic Richard Kuntz was made manager of the machine shop; in 1883 Friedrich Wagner became head of the woodworking shop; in 1885 the oldest and most capable optician, Gottlieb Nold, was designated foreman of his division; and in 1887 the banker, Max Günthert, joined the organization and assisted Leitz in financial matters.

In addition to bolstering his staff with qualified associates, Leitz sought also the cooperation of men of science. The anatomist Richard Altmann was one of his great friends and often a guest in his home. Basic studies of Altmann, Gausa, Abbe, and Helmholtz extended the theory of the microscope ever farther. Abbe came forth with his concept of numerical aperture and the glassmaker Schott, with government subsidy, developed many different and superb varieties of crown and flint glasses. Abbe then designed his famous apochromatic objectives, and these were manufactured by Zeiss in 1886, all of which presented severe competition and a challenge to Leitz.

One of his answers came the following year, in 1887, when he engaged his first scientist, the mathematician Carl Metz, a man who made many contributions that are of importance even today. Calculations for new objectives, periplan oculars, photographic objectives, hemacytometers, a comparison microscope, and a fore-runner of the binocular microscope,

now came from the Wetzlar Institute. Perhaps of chief importance was a contribution soon to be utilized by all optical firms, the semi-apochromatic objectives using fluorite, intermediate in corrections, superior to any achromatic glass, and without some of the drawbacks of the apochromats.

Ludwig Leitz, the eldest son, born in 1867, became his father's right-hand man, and made photomicrography and microtomes his main interests. From 1882 on the company offered a small but efficient photomicrographic apparatus constructed by Ludwig and accompanied by an excellent pamphlet written and illustrated by him on the uses of this instrument. Projection and drawing apparatus soon followed. Ludwig spoke both English and French as if each was his mother-tongue, and this helped mightily with foreign sales. Thus it was a terrible misfortune that befell Ernst Leitz and the Company when Ludwig was thrown from a horse and died in 1898. The blow to the father was softened somewhat by the activities of the second son, Ernst, born in 1871, who speedily proved that he could step into his brother's shoes and perform his tasks with equal ability.

In 1899, when the 50,000th microscope was completed, Leitz celebrated by establishing a company fund for invalids, orphans, and widows. This proved a major factor in subsequent growth of the firm, serving to unite Leitz and his workers in a closer bond. Through loans from this Company Chest he helped many employees in their financial problems and to build their own homes. Ernst Leitz was ever kindly and helpful to others and modest in his own wants. His ability and thoroughness, combined with his manual dexterity, and supplemented with a great love of humanity and keen business sense, made him the great man he was in the optical world. Acknowledged among scholars, he was given an honorary doctorate by the University of Marburg, and the city of Wetzlar made him an honorary citizen.

Until he reached old age Ernst Leitz was able to fulfill his business duties. He outlived his faithful wife and comrade by twelve years, and died July 12, 1920, at the age of seventy-seven. Our next installment will carry the fortunes of E. Leitz, Inc., into the Twentieth Century, under the leadership of Ernst Leitz, der Sohn.

REVIEW

Microtechnique

Dr. Peter Gray, of the University of Pittsburgh, is the author of two works with which all persons interested in microscopy should be acquainted. Dr. Gray was born in London and educated in England. He came to America as Rockefeller Foundation Fellow at Rochester in 1938, went to Pittsburgh

the following year as Associate Professor of Biology, and became head of the department in 1945.

The smaller volume is *Handbook of Basic Microtechnique*, an extremely well written and useful publication that dispenses with theory and references and gets to the business of making the kinds of slides that the average student or technician might wish to prepare. First come materials, then fixation, then staining in general; dehydration, clearing, and mounting; whole mounts, smears, and sections. Cleaning, labeling, and storing finished slides completes Part I. In the second portion there are 15 specific examples of slide techniques, from a whole mount of a mite to a skip-serial of a 72-hour chick embryo.

One of the most serviceable features is the series of pencil drawings by Mrs. Gloria Green Hirsch, depicting steps in the doing of one thing or another, such as the making of a paper imbedding boat, or explanations as to why paraffin ribbons frequently do not perform as advertised. Those who do not need the larger work should own this useful manual. Pp. viii, 141; figs. 57. The Blakiston Co., Philadelphia, 1952. \$3.00.

Encyclopedic in scope, reference in purpose, and very full and modern in treatment is Dr. Gray's *The Microtome's Formulary and Guide*. The *Introduction* describes, concisely and explicitly, just what the book is all about and how to use it, and we can heartily recommend this valuable procedure to anyone coming down with authority. Part I concerns *The Art of Making Microscope Slides*, and comprises 16 chapters on methods, printed in double columns and well illustrated, as in the shorter book. Part II is *Methods and Formulas Used in Making Microscope Slides* and consists of a foreword and 12 chapters. Explanatory material is in double column, the formula in single column and classified by a decimal system so that each formula is given only once and is placed with others to which it is related. References to the literature follow after each heading. In this manner 3500 specific formulas and methods are given in systematic fashion, and this part of the volume, especially, represents an enormous amount of literary search and compilation. A list of books and periodicals cited and an exhaustive *Index* close the work.

Dr. Gray has performed an invaluable service for all who do advanced or research tasks in microtechnique. Precise meanings are given to formulas, with citations to original sources by authors, alphabetically arranged. Pp. xiii, 794; figs. 87. The Blakiston Co., New York, 1954. \$10.50.

Between release of these two books, the publishers moved from Philadelphia to New York, and have now merged with the McGraw-Hill Book Co., Inc., 330 W. 42d St., New York 36, N. Y. Enquiries should be addressed to the Blakiston Division of McGraw-Hill.

"¡Valiente!" cried the Spanish admiral

He cheered as his launch fished this man and seven more waterlogged American sailors out of Santiago Harbor, Cuba, on the morning of June 4, 1898. This was straining Spanish chivalry to the break-



ing point, for Richmond Hobson (right) and his little suicide crew had spent the previous night taking a ship into the harbor entrance under a hail of cannonade and deliberately sinking her

to bottle up the Spanish fleet.

Hobson, who planned and supervised every detail of the operation, from placing the scuttling charges to dropping anchor under fire, was actually an engineer, not a line officer.

In Santiago Harbor, he led his first and only action against the enemy. But his cool-headed daring made him as much a hero of the day as Admiral Dewey. And proved again that America's most valuable product is Americans.

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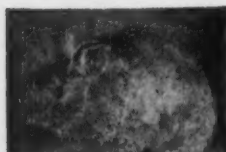
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